EVALUATION OF VOIDING DYSFUNCTION IN WOMEN

A PROSPECTIVE STUDY

A THESIS SUBMITTED TO

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT (PUNJAB)

IN THE PARTIAL FULFILLMENT FOR THE AWARD OF DEGREE OF

M.Ch.

IN

UROLOGY

MAY 2022

Submitted By

DR. AZHAR ANWAR

DEPARTMENT OF UROLOGY
DAYANAND MEDICAL COLLEGE AND HOSPITAL
LUDHIANA, PUNJAB

DECLARATION BY THE CANDIDATE

I hereby declare that the thesis entitled "**EVALUATION OF VOIDING DYSFUNCTION IN WOMEN: A PROSPECTIVE STUDY**" submitted towards partial fulfillment of the requirements for the award of **M.Ch. in Urology** degree to BFUHS is a compilation of original work carried out by me under the supervision of Dr. Sandeep Sharma, Professor & Head, Dr. Harmandeep Singh Chahal, Associate Professor, Department of Urology. No part of this thesis has formed the basis for the award of any degree previously.

Dr. Azhar Anwar
Department of Urology,
Dayanand Medical College
& Hospital,
Ludhiana, Punjab

Date:

Place:

CERTIFICATE OF SUPERVISORS

This is to certify that the work incorporated in this thesis entitled "**EVALUATION OF VOIDING DYSFUNCTION IN WOMEN: A PROSPECTIVE STUDY"** has been carried out by **Dr. AZHAR ANWAR** under our direct supervision. The data incorporated in this thesis is original and genuine and has been carried out by the candidate himself.

Signature of Supervisor

Dr. Sandeep Sharma
Professor & Head
Department of Urology
DMC&H, Ludhiana

Signature of Co-Supervisor

Dr. Harmandeep Singh Chahal
Associate Professor
Department of Urology
DMC&H, Ludhiana

Date:

ENDORSEMENT BY THE HEAD OF THE INSTITUTE

This is to certify that the thesis entitled "**EVALUATION OF VOIDING DYSFUNCTION IN WOMEN: A PROSPECTIVE STUDY"** is a bonafide research work done by **Dr. AZHAR ANWAR** under the supervision of **Dr Sandeep Sharma**, Professor & Head, **Dr. Harmandeep Singh Chahal**, Associate Professor, Department of Urology in this institution.

Principal

Dr. Sandeep Puri
Principal
DMC&H, Ludhiana

Date:

COPYRIGHT

Declaration by the Candidate

I hereby declare that the Baba Farid University of Heath Sciences, Faridkot, shall have the rights to preserve & use this thesis in print or electronic format for academic/study purpose by the research scholar/students.

Signature

Dr Azhar Anwar
Department of Urology,
Dayanand Medical College & Hospital,
Ludhiana, Punjab - 141001

Date:

© Baba Farid University of Health Sciences, Faridkot

Dedicated to my Teachers,

Family and Friends.

ACKNOWLEDGEMENT

I offer my reverence to Almighty God for enlightening the path and being the guiding force through all the crests and troughs in this journey.

I express my gratitude and sincere thanks towards my respected teacher, guide and supervisor, Dr. Sandeep Sharma, Professor and Head of Department Urology at Dayanand Medical College and Hospital, Ludhiana for his constant encouragement, reasoned criticism and painstaking supervision throughout the preparation of this dissertation. I have benefitted from his stimulating guidance, scholarly approach and devotion to academic pursuits. His precious suggestions and constant encouragement at each step have contributed the most in materialization of this thesis work.

My sincere thanks to my teacher and co-guide, Dr. Harmandeep Singh Chahal, Associate Professor, Department Urology at Dayanand Medical College and Hospital, Ludhiana who with his professional expertise has provided able guidance throughout the course of my study and in the preparation of this dissertation. I am thankful for his help, guidance and cooperation in every possible manner.

My sincere thanks to Dr. Arvind Goyal, Associate Professor, Department of Urology, for his words of inspiration. His knowledge, guidance and constant encouragement has gone a long way in ensuring the completion of this study.

With immense regards, I take this opportunity to express my gratitude towards all my previous teachers who’s blessing and encouragement have been the guiding light in my academic path.

I would like to give due credit of my success and achievements to my Parents and my Sisters for their unswerving support and believe. I thank my wife Dr. Zari Anjum for her constant encouragement and reviewing the manuscript.

I express my sincere thanks to my seniors, Dr Vipul Bakshi and Dr Tariq Mir for giving all the necessary support with respect to managing time from their own experience and especially for being exemplary model for a post graduate.

I thank my colleague Dr Vivek Gorka for his constant support and sharing my ups and downs throughout this interesting journey.

I thank my juniors, Dr Naman Singhal and Dr Sunit Tandon for sharing the work burden, which helped me to concentrate on gathering data and draft the manuscript meticulously.

Last but not the least, I also thank out departmental staff Mr. Jasmail Singh, Mr. Parveen Singh, Mr. Sunil Kumar, Mr. Puran Ji, Mr. Sandeep, Mr. Manoj, Sister In-charge and Clerical and Nursing Staff of Urology Ward for their cooperation and constant moral support.

I duly acknowledge the efforts of Mrs. Niharika, Mrs. Namita and all the R&D staff for their skillful analysis and careful typing of the manuscript.

I owe my sincere thanks to my patients, who formed the backbone of this study.

Dr. Azhar Anwar

ABBREVIATIONS

DM	- Diabetes Mellitus
DO	- Detrusor Overactivity
DSD	- Detrusor Sphincter Dyssynergia
DUA	- Detrusor Underactivity
DV	- Dysfunctional Voiding
EMG	- Electromyography
ICIQ	- International Consultation of Incontinence Questionnaire
ICIQ-SF	- ICIQ - Short Form
ICIQ-UI-SF	- ICIQ - Urinary Incontinence - Short Form
IPSS	- International Prostate Symptom Score
OAB	- Overactive Bladder
P det max	- Maximum P Det
P det	- Detrusor Pressure
Pdet Qmax	- P Det at Q Max
PFM	- Pelvic Floor Muscles
PFS	- Pressure-Flow Study
POP	- Pelvic Organ Prolapse
POPQS	- Pelvic Organ Prolapse Quantification System
PVR	- Postvoid Residual Urine Volume
Q max	- Maximum Urinary Flow Rate
UDS	- Urodynamic Study
UFM	- Uroflowmetry
US	- Ultrasonography
VCUG	- Voiding Cystourethrogram
VD	- Voiding Dysfunction

ABSTRACT

Introduction: Female voiding dysfunction has not been studied actively. Its prevalence varies between 2% and 65% and appears to increase with age. It is a major concern and reason for poor quality of life.

Aim of Study: 1. To identify the causes of voiding dysfunction in women above 18 years of age. 2. To correlate the factors associated with voiding dysfunction.

Materials & Methods: This Prospective study was conducted at Dayanand Medical College and Hospital among 100 women for three consecutive years. It included women above the age of 18 with lower urinary tract symptoms and women with IPSS score above 7 and also who consented for the study. Those with UTI were treated with appropriate antibiotics before enrolment. Individual IPSS score (Total, Voiding Subscore, Storage Subscore, V/S ratio) were recorded. ICIQ-UI-SF Questionnaire, POPQS were used where applicable. History regarding hormonal status, diabetes, neurological disease, previous urological or gynecological intervention and recurrent UTI was recorded. Urine routine, culture, ultrasonography, uroflowmetry, urodynamic study and cystoscopy were done as indicated. Recorded data was evaluated using appropriate statistical tests.

Results: Mean age of study population was 54.4 ± 16.8 years. Most common cause of Voiding dysfunction in these women was Bladder Outlet Obstruction (38.3%), followed by Overactive Bladder (20%) and Detrusor Underactivity (19.1%). Least common causes included Stress Urinary Incontinence (14.1%) and other Inflammatory Pathologies (8.3%). Total IPSS and its Subscore showed significant difference in various diagnosis. Most diagnosis did not show any significant difference in pre-and post-menopausal women. Presence of diabetes showed a significant association with Detrusor Underactivity (60.87 %). Neurological diseases were most prevalent with Stress Urinary Incontinence. Bladder Outlet Obstruction, Inflammatory Pathologies showed a significant association with previous history of uro/gynac intervention and recurrent UTI was most common in those with Bladder Outlet Obstruction (69.57 %) and Detrusor Underactivity (78.26 %).

Conclusion: In this study we have attempted to establish the prevalence of various causes of voiding dysfunction in women and evaluated demographic parameters and investigational variables that assist developing such diagnosis that is essential for institution of appropriate therapy and early management of Voiding Dysfunction.

Keywords: Voiding Dysfunction, Urology, Urogynecology, Quality of Life.

CONTENTS

Sr. No.	Chapter	Pages
I.	Introduction	1
II.	Aims and objectives	8
III.	Review of literature	9
IV.	Materials and methods	17
V.	Observations and results	21
VI.	Discussion	38
VII.	Summary	46
VIII.	Conclusion	48
IX.	Limitations	49
X.	References	50
XI.	Annexures I • Proforma • Master chart	
XII.	Annexures II • Approval letter of Thesis Plan • Thesis Plan	

LIST OF TABLES

Table No.	Title	Page No.
1.	Causes of Bladder Outlet Obstruction	3
2.	Baseline Characteristics	22
3.	Age Wise Distribution of the Study Group	23
4.	IPSS score	24
5.	Quality of Life Assessment	26
6.	Hormonal Status	27
7.	Diabetes Mellitus	28
8.	History of Neurological disease	29
9.	History of Uro. / Gynec. Surgery	30
10.	History of Recurrent Urinary Tract Infection	31
11.	Ultrasonography Findings	32
12.	Urine Flowmetry Analysis	33
13.	Total Bladder Capacity	34
14.	Bladder Compliance	35
15.	Maximum Detrusor Pressure	36
16.	Distribution of Voiding Dysfunctions	37

LIST OF FIGURES

Fig. No.	Title	Page No.
1.	Etiology of voiding dysfunction	4
2.	Uroflowmetry and Urodynamic Study	6
3.	Age Wise Distribution of the Study Group	23
4.	IPSS score	25
5.	Quality of Life Assessment	26
6.	Hormonal Status	27
7.	Diabetes Mellitus	28
8.	History of Neurological disease	29
9.	History of Uro. / Gynec. Surgery	30
10.	History of Recurrent Urinary Tract Infection	31
11.	Ultrasonography Findings	32
12.	Urine Flowmetry Analysis	33
13.	Total Bladder Capacity	34
14.	Bladder Compliance	35
15.	Maximum Detrusor Pressure	36
16.	Distribution of Voiding Dysfunctions	37

INTRODUCTION

Lower urinary tract symptoms (LUTS) have been traditionally associated with the prostatic diseases in men and overactive bladder (OAB) in women. Only recently has male Overactive Bladder become a subject of interest. However, Female voiding dysfunction has not been studied as actively.

The International Continence Society (ICS) states that: 'Normal voiding is achieved by a voluntarily initiated continuous detrusor contraction that leads to complete bladder emptying within a normal time span and in the absence of obstruction'.[1]

Urologists often encounter women complaining of voiding difficulties without any evident urinary tract infection, but they are often overlooked due to the lack of clear definitions, diagnostic criteria, and treatment guidelines.

Depending on the definition, voiding dysfunction has a prevalence of 4% [2] to 39% [3], the latter figure making it the third or fourth most common urodynamic diagnosis (after urodynamic stress incontinence, pelvic organ prolapses, and possibly detrusor over activity).

A broad range of definitions of Voiding Dysfunction in women have been suggested. It is a diagnosis of symptoms and urodynamic investigations, and is defined by ICS / IUGA (International Uro-Gynecological Association) as abnormally slow and/or incomplete micturition. Abnormal slow urine flow rates and abnormally high post void residuals form the basis of this diagnosis.[4] This diagnosis should be based on a repeated measurement to confirm the abnormality.

Female Voiding Dysfunction might be related to detrusor under activity and/or bladder outlet obstruction. Voiding and storage symptoms can coexist, making the diagnosis challenging, with the need for targeted clinical investigation, and further evaluation with imaging, uroflowmetry and urodynamic studies.[5]

Aetiological factors for Female Voiding Dysfunction

Voiding Dysfunction is used to describe a clinical condition that affects bladder emptying. Identifying aetiological factors is crucial to the management of women with voiding dysfunction and will have an impact on treatment decisions and prognosis.

Primarily bladder causes

Underactivity or areflexia of the detrusor muscle results in the buildup of residual volumes of urine. Weakness of the detrusor muscle can be linked to damage of the peripheral nerves of the bladder as in diabetic neuropathy or damage caused to the lower spinal cord.[6]

Causes of urinary retention in females may be attributed to chronic constipation, childbirth trauma (including labor and delivery), spinal anesthesia, neurological disease, uterine fibroids, ovarian cysts or anticholinergic and/or psychotropic medication.

Abnormal detrusor muscle activity-

The ICS defines Detrusor Underactivity as ‘a contraction of reduced strength and/or duration, resulting in prolonged bladder emptying and/or failure to achieve complete bladder emptying within a normal time span’

‘Primary’ or ‘idiopathic’ Detrusor Underactivity is thought to be an age-related decrease in detrusor contractility with no other cause. Cerebral (especially pontine), spinal sacral and sub sacral lesions can cause Detrusor Underactivity or Acontractile Detrusor. [7]

Detrusor Underactivity can result from iatrogenic nerve damage after radical pelvic surgery, due to peripheral, mostly partial, sympathetic and parasympathetic denervation. More than half of women with a normal urinary tract function before surgery have voiding problems after a radical hysterectomy, at least temporarily, use abdominal straining or need catheterization [8]

Bladder and Urethral causes

The causal factors for female Bladder Outlet Obstruction are either anatomical or functional as enumerated in the Table 1.

Urethral stenosis can arise as a result of scar tissue formed by prolonged urethral catheterization or instrumentation, such as cystoscopy or urethral dilation, inflammation, infection or urethral injury. [8]

Table 1: Causes of Bladder Outlet Obstruction

1	Anatomical	Iatrogenic obstruction: • Anti-incontinence (sling) procedures • Urethral procedures • Pelvic organ prolapses • Anterior vaginal wall prolapses • Apical prolapse (procidentia) Inflammatory process: • Inflammation of urethra • Urethral stricture • Urethral diverticulum Miscellaneous: • Bladder calculi/tumor • Retroverted uterus • Female genital tumor
2	Functional	Dysfunctional voiding Detrusor sphincter dyssynergia Fowler's syndrome

Inflammatory causes

Retention of urine may occur due to painful infective, allergic, or chemical reactions of the urogenital tissues.eg: granulomatous cystitis, post radiation cystitis, chronic cystitis, interstitial cystitis, post BCG cystitis. [7]

Neurogenic causes

Lower urinary tract symptoms are often seen in patients with Parkinson's disease Patients with neurological disorders, such as multiple sclerosis (MS) or spinal cord pathologies can present with voiding dysfunction. [9] Loss of inhibitory function can lead to hyperreflexia and loss of voluntary control, which results in loss of co-ordination of the detrusor and voiding pattern.

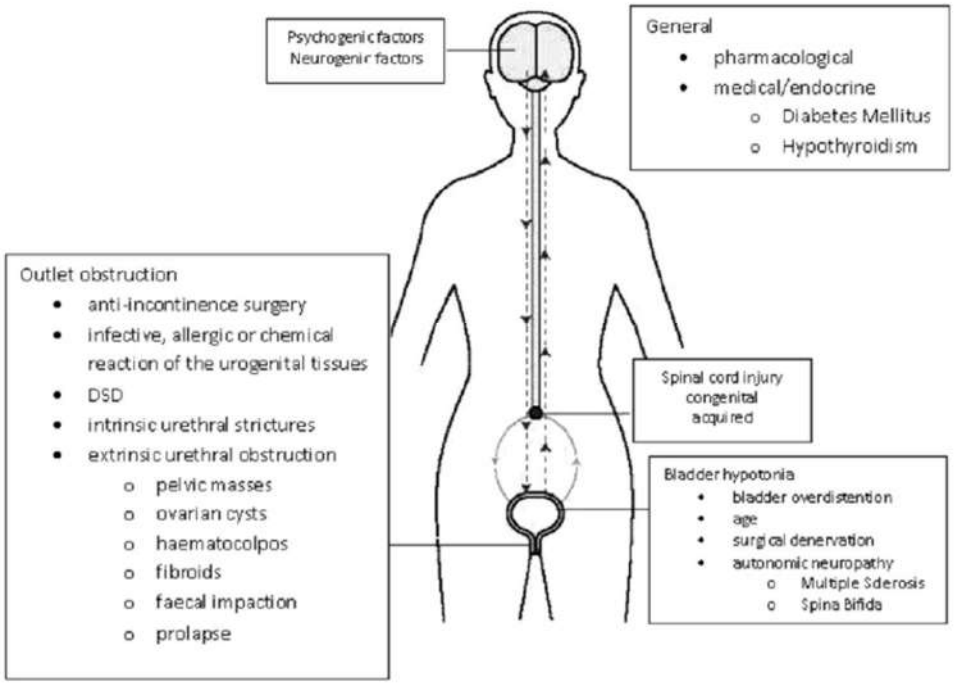
Endocrine causes

Diabetes mellitus is the most common endocrine disorder that affects bladder or voiding function. Diabetes is known to cause peripheral neuropathy, which affects bladder due to myogenic factors. A good example of this is 'diabetic cystopathy', a term first introduced by Frimodt-Moller [10] to describe lower urinary tract symptoms associated with Diabetes Mellitus.

Miscellaneous

Psychological factors, menopause [11], constipation [12], immobility, anesthesia, and recurrent urinary tract infections etc. may also lead to voiding dysfunction. The classification can also be depicted as in Figure 1 below. [13]

Figure 1: Etiology of voiding dysfunction



<u>The Diagnosis of Female Voiding Dysfunction</u>

Lower Urinary Tract Symptoms (LUTS) can be grouped as Storage, Voiding and Post micturition symptoms

Storage symptoms include increased daytime frequency, Nocturia, Urgency, Urinary incontinence (Stress urinary incontinence, Urge urinary incontinence or Mixed urinary incontinence), Enuresis, Nocturnal enuresis and Continuous urinary incontinence. [13]

Voiding symptoms are Slow stream, Intermittent stream, Splitting or spraying, Hesitancy, straining to void and Terminal dribble. Postmicturition symptoms include Feeling of incomplete emptying and postmicturition dribble.[7]

Voiding Dysfunction can predispose to acute or chronic urinary retention. In acute retention, the patient is unable to pass urine and has a palpable or percussable bladder.[1] Chronic retention has a more insidious presentation with patients typically complaining of frequency, poor stream, overflow incontinence, or recurrent urinary tract infections (UTI).[14] These can, in turn, lead to decompensation of proximal urinary tract, vesicoureteral reflux and injury to renal parenchyma.

Diagnosis and treatment of female voiding dysfunction are based on a thorough history and examination and appropriate investigations.

Physical examination

Suprapubic fullness may be present on examination of the abdomen. A pelvic examination may show vaginal atrophy, pelvic organ prolapses, vulvo-vaginitis or pelvic mass. Urethral and anterior vaginal wall palpation can detect urethral tenderness, a diverticulum or scarring. [7] The bulbocavernosus reflex (squeezing of the clitoris induces anal sphincter contraction) can be used to test the spinal reflex activity of L5–S5, and the spinal reflex activity of the S4–S5 nerve roots by anal reflex testing.

Urine analysis and urine culture

Post Void Residual Urine (PVR), bladder wall thickness can be assessed by Ultrasonography (US/USG). It also helps identify any associated pathologies, e.g., bladder stone or diverticulum. UTI in women has been reported to be associated with Voiding Dysfunction; up to 42% of female patients with Voiding Dysfunction had a history of recurrent UTI. [15]

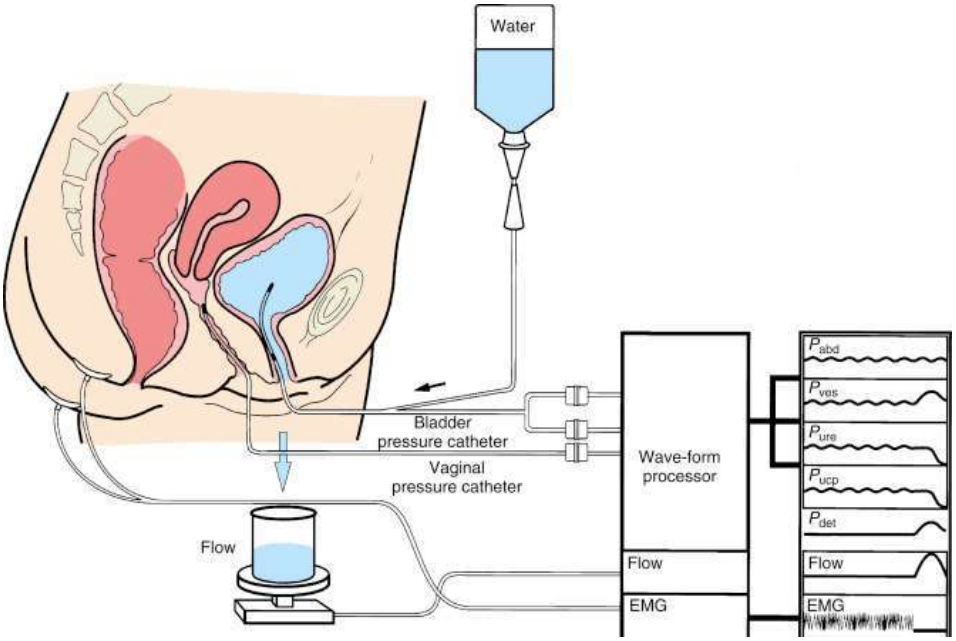
Non-invasive urodynamic testing

Uroflowmetry may show a prolonged and either continuous, fluctuating or interrupted pattern with no peak (plateau pattern) with a decreased maximum and mean flow rate.

Symptoms are poorly specific for diagnosis of voiding dysfunction, which will often require identification of both clinical and urodynamic features. Uroflowmetry, an easy test to perform, should be considered the first step toward diagnosis.[13]

Figure 2: Uroflowmetry, Urodynamic Study

(Graphical representation)



<u>Treatment approach for women with Voiding Dysfunction</u>

Treatment should be individualized and always starts with non-invasive and conservative options followed by introduction of pharmacotherapy and lastly surgery. There is need for more research in defining female voiding dysfunction and a standardized classification. This can bring more consistency in treatment and follow up.[9]

Voiding dysfunction also is a major cause of bother and reason for poor quality of life scores. Improvements of voiding and storage symptoms correlate with improvements of QoL.[5]

This study intends to identify the causes and thus help treat voiding dysfunction in women. Consequentially it would help improve quality of life scores and avoid end stage renal disease in these patients.

AIMS AND OBJECTIVES

AIMS

- The evaluate lower urinary tract symptoms and their pathology in women.

OBJECTIVES

- To identify the causes of voiding dysfunction in women above 18 years of age.
- To correlate the factors associated with voiding dysfunction.

REVIEW OF LITERATURE

Definition

Voiding dysfunction (VD) a diagnosis by symptoms and urodynamic investigations is defined by ICS/IUGA as abnormally slow and/or incomplete micturition. Abnormal slow urine flow rates and abnormally high post void urine needs to be considered in conjunction with bladder capacity, patient's symptoms and renal function.

Stanton et al., defined these measures as peak flow rates of < 15 ml/second and/or 200 ml or more of residual urine.[14]

Doumouchtsis broadly grouped the causes of Voiding Dysfunction into the following groups: post-surgical, bladder over distention, inflammatory, outflow obstruction, neurogenic, pharmacological, medical and psychogenic.[13]

A study conducted by A Abdel Raheem [5] in 2013 reported that Female VD might be related to detrusor underactivity or/and bladder outlet obstruction. The symptoms of Voiding and Storage can coexist, making the diagnosis challenging, with the need for a targeted clinical investigation, and further evaluation by imaging and urodynamic testing. For therapy, a complete cure might not be possible for patients with VD, therefore relieving the symptoms and minimizing the long-term complications associated with it should be the goal.

Prevalence

A study by Debra E Irwin et al [15] was conducted in five countries to study the prevalence of OAB and LUTS in women and men. Out of 19165 individuals around 64.3% had at least one Lower Urinary Tract Symptoms. The overall prevalence of OAB was 11.8%. The prevalence of storage LUTS was greater than that for voiding and postmicturition symptoms combined. The EPIC study is the largest population-based survey to assess prevalence rates of Overactive Bladder, Urinary Incontinence and other LUTS in these five countries.

A study by Soo-Cheen Ng [16] was conducted to evaluate the prevalence of lower urinary tract symptoms, OAB and voiding dysfunctions in local community residents aged 40 years and above in central Taiwan. Out of 2411 residents 60.9% were women. Out of which the prevalence of OAB, UUI and VD were 33.1%, 26.8% and 28.3% respectively in the female community residents. Age≧60 (OR, 1.5; 95%CI, 1.1–2.0), menopause (OR1.4; 95% CI, 1.0–1.9) and a history of diabetes mellitus (OR, 1.8; 95% CI, 1.2–2.8) were the risk factors for OAB. Age≧60 (OR, 1.4; 95%CI, 1.0–1.9), BMI ≧25 (OR, 1.3; 95% CI, 1.0–1.7) and instrument deliveries (OR, 1.5; 95% CI, 1.0–2.1) were the risk factors for VD.

A study by Moossdorff Steinhauser H [17], reported that out of 4470 women, prevalence of (self-reported) voiding Lower urinary tract symptoms was 59.5%. Incomplete bladder emptying was the most important and prevalent voiding complaint. Age correlation with voiding dysfunction was found to be weak ($r = 0.15$, $p < 0.01$) and have moderate correlation with self-reported recurrent urinary tract infections ($r = 0.34$, $p < 0.01$).

Evaluation

Ku, J. H. et al [18] studied 7-day voiding diary as a valid tool for symptom evaluation. They also evaluated role of 2-day and 3-day bladder dairy and found that there was no difference in the accuracy.

A study done by Yong Sun Choi et al. [19], on 1415 women in nine hospitals reported that around 792 women presented with LUTS. They also analyzed the results with International Prostate Symptom Score (IPSS) and used uroflowmetry, residual urine volume and urine analysis. They reported that a hundred and two patients (12.8 %) from a total of 792 LUTS patients complained of voiding difficulty. Among the seven categories of IPSS, incomplete emptying was the most common symptom followed by weak stream. Eighty-nine patients (87.2 %) from a total of 102 voiding dysfunction patients showed BOO, while 13 patients (12.8 %) showed detrusor underactivity.

Similar scoring system was used by Sheng-Mou Hsiao [20] to evaluate lower urinary tract symptoms (LUTS) in women using the International Prostate Symptom Score (IPSS). A total of 222 women were enrolled for the study. A significantly higher IPSS voiding to storage sub score ratio (IPSS-V/S) and IPSS voiding score were found in the voiding dysfunction group. Significantly higher IPSS Storage Subscore (IPSS-S) values were found in the Overactive Bladder subgroup, and the IPSS-S was well correlated with the OABSS and IUSS

A review by Lawrence O. Olujide and Suzanne O'Sullivan [21], examined the current knowledge on the management of female voiding dysfunction and how it affects the sufferers' quality of life. The study focused on the methods of diagnosis as well as the importance of detailed history taking. They also mentioned that the role of surgery is limited except for those with postoperative voiding problems after new generation sling procedures. A multidisciplinary approach is essential to success.

Avery et al [22] found that International Consultation of Incontinence Questionnaire (ICIQ) is a robust measure of the symptoms and impact of incontinence that is suitable for use in clinical practice and research. Its use will facilitate the comparison of findings from divergent settings and studies, and thereby enable a more consistent and unified approach to the assessment of urinary incontinence and its impact on Quality of life. The final ICIQ comprises three scored items and an unscored self-diagnostic item. It allows the assessment of the prevalence, frequency, and perceived cause of urinary incontinence, and its impact on everyday life

Sirls, L. T. et al [23] in a prospective, large, multi-center, surgical cohort study validated clinical anchors used to establish the ICIQ - Urinary Incontinence - Short Form (ICIQ-UI-SF) minimum important difference (MID). They also mention that, individual researchers may need to determine whether it is appropriate to generalize these MID to non-surgical populations.

According to Abrams et al. [24], in patients with suspected voiding dysfunction, PVR should be part of the initial assessment if the result is likely to influence management. VD in women is reported to be associated with a PVR of >30% of the functional bladder capacity.

A study by A Groutz [25], reported that out of 206 female patients, 127 (61.7%) women reported having voiding difficulty symptoms; 79 others (38.3%) were free of such symptoms. Voiding difficulty by urodynamics (UDS) was found to be 38.3% (27 in the symptomatic group and 13 in the asymptomatic group). Urodynamic diagnosis of voiding difficulty was made in 40 women (19.4% of the study population): 27 in the symptomatic group and 13 in the asymptomatic group (21.2% and 16.5%, respectively)

The role of Urodynamic Study continues to be a heavily debated subject for assessing female patients with LUTS. Nonetheless, UDS remains a valuable diagnostic test that provides vital information with minimal morbidity.

Yamanishi, T. [26] stated that characteristic features of various types of lower urinary tract symptoms, including urinary incontinence, bladder outlet obstruction and neurogenic bladder, can be identified by UDS.

In Normal subjects the filling phase, detrusor pressure does not usually increase (it is stable) when the first sensation is noted at 150–250 mL or at the maximum cystometric capacity of 300–500 mL in volunteers. Detrusor over-activity (DO) is defined as involuntary detrusor contractions during the filling phase, which may be spontaneous or provoked. The most common cystometric finding is detrusor over-activity, and a few patients with cortical lesions show DSD

Associated factors

Hormonal status:

Robinsons D [27] in his study reported that estrogen deficiency may cause urogenital atrophy which aggravates lower urinary tract symptoms such as frequency, urgency, nocturia and urinary incontinence.

Diabetes:

A study by Sonia Kouba [28] stated that of 40 patients with diabetes mellitus included in their study, the mean age was 55 years. Out of these 32 patients had voiding dysfunction.

A study by Changxiao [29] investigated the impact of diabetes mellitus (DM) on female lower urinary tract dysfunction. Ninety-three percent of diabetic women complained of lower urinary tract symptoms, and 88% had positive urodynamic findings.

Urogynecology Disorders:

Tsia-Shu Lo et al [30] evaluated the effect of short-term or long-term obstruction through vaginal pelvic reconstruction and found that surgery enables bladders to regain detrusor muscle function thus emphasizing of the effect of pelvic organ prolapse as a cause of voiding dysfunction in women. A total of 49 patients were evaluated. Preoperatively, 38 patients (75%) had stage III prolapse and 13 patients (26%) had stage IV. Subjective cure rate of DU was 76% and objective cure rate was 47%. Voiding function showed significant increase in Qmax ($P < 0.001$) and Pdet Qmax ($P < 0.001$) while PVR ($P < 0.001$) and cystometric capacity ($P < 0.001$) significantly decreased. These findings were observed in 89% (43/49) of patients with post-void residual urine (PVR) of <200 mL, 63% (31/49) with Qmax > 12 mL/s, and 57% (28/49) with Pdet Qmax >10 cmH2 0.

Urinary Tract Infections:

A study by Carlson [31] retorted that UTI in women has been found to be associated with VD; up to 42% of female patients with VD had a history of recurrent UTI. Mean total American Urological Association-7 score was 24.4 of 35. The most common presenting symptoms were frequency and urgency in 82% of cases. Urge and stress incontinence was noted in 6 (23%) and 4 patients (15%), respectively, while 11 (42%) had a history of recurrent urinary tract infection. Mean storage score was 11.3 of 15 and mean voiding score was 13.2 of 20. Cystometrography

revealed detrusor instability in 11 cases (42%), sensory urgency in 11 (42%) and impaired compliance in 2 (8%).

Zermann DH et al. [32] observed that there is a high incidence of bladder dysfunction of different degrees in patients with renal failure. A urodynamic assessment before renal transplantation is recommended in all patients reporting symptoms of dysfunctional voiding and/or bladder storage problems in order to avoid allograft dysfunction due to chronic bladder dysfunction and related complications.

Diagnoses

Bladder Outlet Obstruction

Groutz, A. et al [33] defined Bladder outlet obstruction as maximum "free" flow rate of <12 mL/s on repeated non-invasive uroflow studies, combined with high detrusor pressure at a maximum flow (>20 cmH_2O) during urodynamic study. The mean maximum "free" flow, voided volume, and residual urinary volume were 9.4 +/-3.9 mL/s, 144. 9 +/- 72.7 mL, and 86.1 +/- 98.8 mL, respectively. The mean PdetQmax was 37.2 +/- 19.2 cm H(2)O.

Overactive Bladder:

Dudley Robinson [34] stated that a number of women may be managed based on a clinical diagnosis alone. Urodynamic studies may be useful in those women with complex or refractory symptoms. In the first instance all women will benefit from a conservative approach using bladder retraining. For those women with persistent symptoms following medical therapy alternative treatment modalities such as intravesical Botulinum Toxin, neuromodulation or reconstructive surgery may be considered

Detrusor Underactivity:

A study by Fusco et al [35] have used Pdet at Qmax of 30 and Qmax of ≤12 in uroflowmetry and urodynamic studies to evaluate the prevalence of Detrusor Underactivity in women.

A study by Saqwad [36] used comprehensive history taking, detailed physical examinations, and invasive urodynamic examinations. The ICS Good Urodynamic Practice Standards were followed to perform clinical urodynamic practice. DU was classified into three categories: mild, moderate, and severe based mainly on detrusor pressure considering the maximum urinary flow rate (Pdet at Qmax) values. A Pdet at Qmax of >40 cmH2O is accepted as normal; 30–40 cmH2O as mild; 20–30 cmH2O as moderate, and <20 cmH2O as severe Detrusor Underactivity. It was found that 206 patients included in this study, fifty-one (24.76%) patients were diagnosed with DU.

Inflammatory Pathologies:

A variety of diseases such as interstitial cystitis, granulomatous cystitis, post-BCG cystitis, urethritis or other idiopathic conditions can present with voiding difficulties. They are characterized by infiltration of mononuclear cells leading to irreversible tissue destruction, dysfunctional pathology such as fibrosis and poor compliance, detrusor overactivity, and hyperalgesia responsible for the chronic waxing and waning symptoms of pain and abnormal voiding. [60] They may cause storage or voiding symptoms and are associated with long term morbidity with poor quality of life.

Stress Urinary Incontinence:

Sui- McGuire [37] studied 125 women who were subjected to simultaneous urodynamic and radiologic evaluation. The most common abnormality was a hypermobility of the proximal urethra with loss of its intraabdominal position during stress, associated with changes in the ureterovesical angle. Uninhibited bladder contractions were found in 22% of cases, but in most instances, they were the result of SUI and ceased after surgical repair.

Some patients can present with a history that suggests alternative lower urinary tract pathologies. These symptoms include recurrent UTI, sterile pyuria, concurrent pelvic organ prolapse, bladder pain, hematuria and continuous leakage suggestive of fistula; urinary retention or obstruction;

or neurological symptoms.[61] These should be evaluated and coexisting lower urinary tract and/or other pathologies identified before initiation of definite therapy.

Need for Study

Lower Urinary tract Symptoms (LUTS) in female patients is a very common condition that may carry a serious negative impact on the social, financial, physical, and psychological well-being of patients and their families.

There is still little knowledge regarding prevalence, incidence, and other epidemiological data in developing countries. Emphasis should be laid upon associations between Urinary Incontinence, Pelvic Organ Prolapse and specific diseases like stroke, diabetes, and psychiatric diseases. Abrams et al [24] recommended that fundamental research regarding prevalence, incidence and other epidemiological data in developing countries should be encouraged, and tailored to the environment of the population under study.

MATERIALS AND METHODS

SOURCE OF DATA

Women with the complaint of abnormal urination, admitted or visiting, Department of Urology and other concerned departments, at Dayanand Medical College and Hospital.

METHOD OF COLLECTION OF DATA

Patients were included in the study based on the fulfillment of criteria. Closed ended questionnaires and an IPSS scoring system was used to accumulate the data required for the study.

Inclusion Criteria

- Women above 18 years of age
- Abnormal urination for more than one month

Exclusion criteria

- Bed bound patients
- Individuals not consenting to participate in the study

Number of Cases: 100 cases

Duration of Study: 18 months (March, 2020 - September, 2021)

Consent was taken for the patients who agreed to participate in the study **(Annexure II**). The data was analyzed by their urinary symptoms with an International Prostate Symptom Score (IPSS) and objective data was obtained using uroflowmetry, ultrasound of kidney, ureter and bladder with residual urine volume, and urodynamic study (when indicated).

The International Prostate Symptom Score (IPSS) is based on the answers to seven questions concerning urinary symptoms and one question concerning quality of life. Each question concerning urinary symptoms allows the patient to choose one out of six answers indicating increasing severity of the particular symptom. The answers are assigned points from 0 to 5. The total score can therefore range from 0 to 35 (asymptomatic to very symptomatic). The questions refer to the following

urinary symptoms: Questions Symptom 1 Incomplete emptying 2 Frequency 3 Intermittency 4 Urgency 5 Weak Stream 6 Straining 7 Nocturia Question eight refers to the patient's perceived quality of life **(Annexurel**).

The first seven questions of the IPSS are identical to the questions appearing on the American Urological Association (AUA) Symptom Index which currently categorizes symptoms as follows: Mild (symptom score less than or equal to 7) Moderate (symptom score range 8-19) Severe (symptom score range 20-35).

The IPSS is a valid, reliable and sensitive measure to assess women and men with lower urinary tract symptoms. The IPSS quality of life question is more sensitive than the generic quality of life measure to differentiate subgroups.[20]

Women with lower urinary tract symptoms and IPSS score of more than 7, were selected for the study. A thorough history and physical examination was conducted. Emphasis was given to lower urinary tract symptoms. IPSS score, voiding and storage sub scores and v/s ratio was calculated. A detailed history of urological, gynecological or neurological interventions was taken.

Women with complaint of urine leak suggestive of stress urinary incontinence, a separate questionnaire was used as well. International Consultation of Incontinence Questionnaire – Short Form (ICIQ-SF) is a validated instruments for assessment of stress urinary incontinence (SUI) [22]. The ICIQ-UI (urinary incontinence) Short Form was used for evaluating the frequency, severity and impact on quality of life This questionnaire is used in both primary and secondary care institutions to screen for incontinence, to obtain a brief yet comprehensive summary of the level, impact and perceived cause of symptoms of incontinence and to facilitate patient-clinician discussions **(Annexure I)**.

Examination included a complete general physical assessment and systemic examination anatomical abnormalities external genitalia, any

features of pelvic organ prolapse, abdominal and neurological examination.

Presence of genital organ prolapse was graded as per POPQ system and recorded. It relies on measurements of nine defined points in the midline of the vaginal wall. The fixed reference point used for measurement remains the hymeneal ring. In this system, small increases in prolapse are recorded as small increases in measurement. Because specific measurements at nine sites are recorded in a tic–tac–toe grid, interobserver agreement and reliability are also improved [39] **(Annexure I).**

Urine routine and microscopic examination, urine for culture and sensitivity was sent for all patients. Those testing positive for urinary tract infection were counselled regarding need for treatment.

Renal function tests, ultrasound of the kidneys, ureter and urinary bladder with measurement of post void residual urine was done. Note was made of any hydroureteronephrosis, urinary bladder wall changes post void residual urine and any features suggestive of bladder outlet obstruction.

Uroflowmetry was done for patients as indicated from above assessment. Maximum and average flow rates were recorded. Graph pattern and voiding duration were also considered to come to a working diagnosis.

Patients with Q max < 12ml/sec on uroflowmetry and those with findings suggestive of detrusor underactivity were considered for urodynamics study. The total bladder capacity, maximum detrusor pressure and compliance were recorder. Diagnosis was established considering the above and the Bladder Outlet Obstruction Index and Bladder Contractile Index.

Based on above history, examination and investigations, a diagnosis towards the cause of voiding dysfunction was made. Prevalence of various causes and their association in terms of age distribution, IPSS score, V/S ratio, hormonal status, diabetic status, history of neurological

disease, history of urological / gynecological surgery, history of recurrent UTI, Ultrasonography, Uroflowmetry and Urodynamic study findings was evaluated.

OUTCOME

Primary outcome: To identify the causes of voiding dysfunction in women above 18 years of age and their prevalence.

Secondary Outcome: To correlate the factors associated with voiding dysfunction.

STATISTICAL ANALYSIS

Data were described in terms of range; mean ±standard deviation (± SD), frequencies (number of cases) and relative frequencies (percentages) as appropriate. Comparison of quantitative variables between the study groups was done using ANOVA. For comparing categorical data, Chi square ($\chi 2$) test was performed. A probability value (p value) less than 0.05 was considered statistically significant. All statistical calculations were done using (Statistical Package for the Social Science) SPSS 21version (SPSS Inc., Chicago, IL, USA) statistical program for Microsoft Windows.

OBSERVATIONS AND RESULTS

The present study was conducted in the Department of Urology, Dayanand Medical College and Hospital, Ludhiana over a period of 18 months. A hundred consecutive patients presenting to Urology and allied departments with lower urinary tract symptoms, fulfilling the inclusion criteria and none of the exclusion criteria were selected for the study.

Most common cause of Voiding dysfunction in these women was found to be Bladder Outlet Obstruction (46%), followed by Overactive Bladder (24%) and Detrusor Underactivity (23%). Least common causes included Stress Urinary Incontinence (17%) and other Inflammatory Pathologies (10%).

Baseline Characteristics

The subjects enrolled in the study were analyzed and a diagnosis was made based on various parameters in history, examination and investigations. In this study, mean age of women presenting with voiding dysfunction was found to be 54.4 ± 16.8 years.

A detailed history of various symptoms was recorded using the IPSS score which showed a mean total score of 19.6 ± 4.9, mean Voiding Subscore of 10.8 ± 4.2 and a mean Storge Subscore of 8.8 ±3.18. The mean IPSS V/S ratio for the study population was 1.76 ± 2.16.

Quality of life was variedly affected for women with these lower urinary tract symptoms. As recorded by the patient on IPSS scale the mean value was 4.2 ± 2.3.

Most of these women were past their menopause (61%) and 35% were known diabetic. 64% gave history of one or more episodes of urinary tract infection in the past (treated).

Around 22% of the women gave history of preexisting neurological disease/s. Most common among them were vertebral disc prolapse (13%), Alzheimer's' and history of previous spinal surgery.

Thirty nine percent of these women had previously undergone a urogynecology procedure. In the study group, lower segment caesarian section and hysterectomy for varied indications were most common.

Table 2: Baseline Characteristics

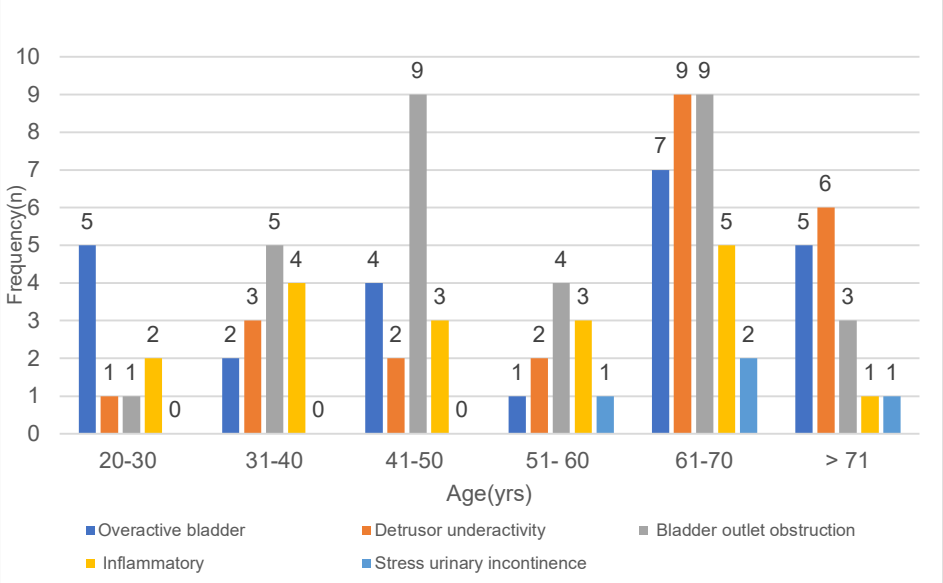
Parameters	**Total (N=100)**
Age	54.4 ± 16.8
IPSS (Total score)	19.6 ± 4.9
Quality of Life	4.2 ± 2.3
Hormonal Status	
Post-menopausal	61 (61 %)
Pre-menopausal	39 (39 %)
Diabetes	
Diabetic	35 (35 %)
Non-Diabetic	65 (65 %)
History of Neurological diseases	
Absent	78 (78%)
Alzheimer	3 (3 %)
CVA	2 (2 %)
PIVD	13 (13 %)
Scoliosis	1 (1%)
Spinal Surgery	3 (3 %)
History of Urological / Gynecological Intervention	
Absent	61 (61%)
LSCS	20 (20 %)
Hysterectomy	19 (19%)
Cystoscopy (CPE)	14 (14 %)
Carcinoma Urinary Bladder (CAUB)	3 (3 %)
Forceps Delivery	2 (2%)
Vaginoplasty	1 (1%)
History of Recurrent UTI	
Present	64 (64 %)
Absent	36 (36 %)

Table 3: Age Wise Distribution of the Study Group

Age(yrs)	OAB	DUA	BOO	INFLM.	SUI	Total
20-30	5	1	1	2	0	9
31-40	2	3	5	4	0	14
41-50	4	2	9	3	0	18
51- 60	1	2	4	3	1	11
61-70	7	9	9	5	2	32
> 71	5	6	3	1	1	16
Total	24	23	46	10	17	

Age-wise distribution of the study population showed maximum number of patients in the 60-70 years age group. In terms of diagnosis, bladder outlet obstruction was the most common (38%), followed by overactive bladder. Inflammatory pathologies (8.3%) were least common.

Figure 3: Age Wise Distribution of the Study Group



It was noted that relative frequency of overactive bladder was maximum in age group of 20-30 years, in all other age groups, BOO was the most common pathology, except in women more than 71 years of age, in whom, detrusor underactivity was most common.

Table 4: IPSS score

Diagnosis	IPSS T score	IPSS V score	IPSS S score	IPSS V/S
OAB	12.46 ± 2.4	5.54 ± 1.8	8.45 ± 2.5	0.85 ± 2.65
DUA	25.4 ± 3.8	14.4 ± 3.34	10.4 ± 4.5	1.2 ± 0.08
BOO	19.34 ± 4.9	13.3 ± 5.4	7.1 ± 3.76	1.29 ± 0.68
INFLM.	15.2 ± 5.7	7.4 ± 6.3	8.9 ± 3.9	1.06 ± 0.74
SUI	12.5 ± 6.7	8.4 ± 3.6	4.6 ± 1.56	1.8 ± 0.34
P value*	0.023	0.014	0.012	0.002

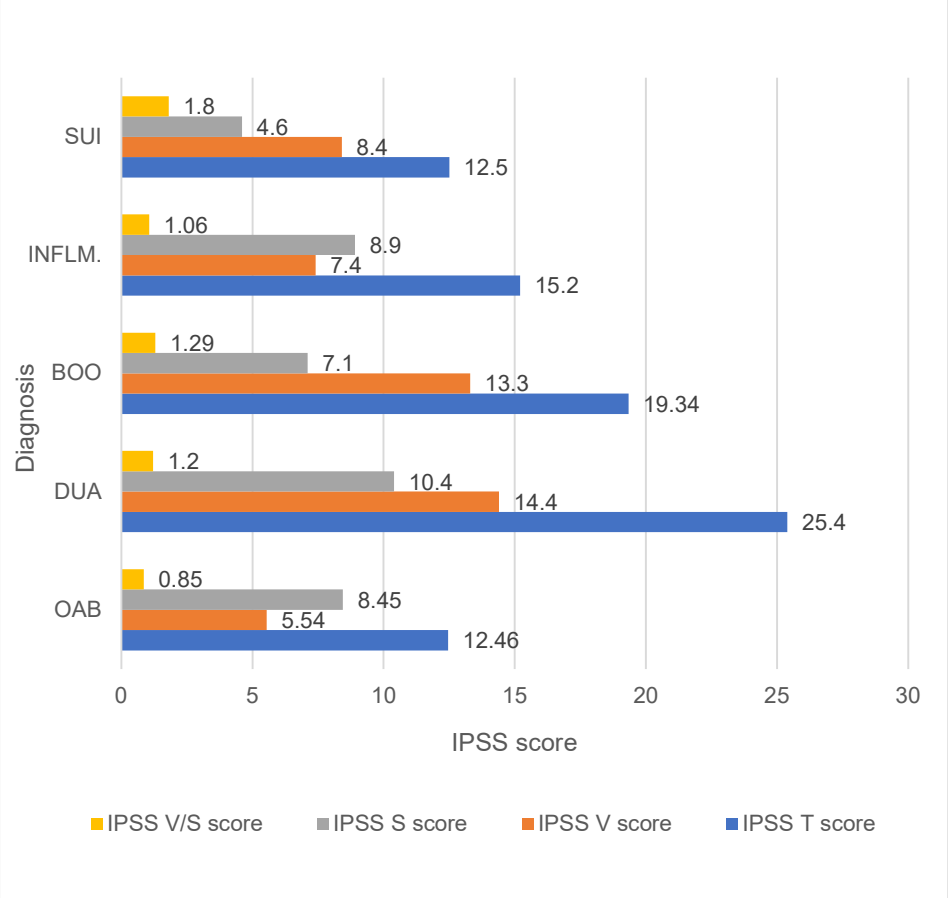
The IPSS scores were assessed and it was seen that the Total IPSS score was significantly higher in detrusor underactivity (25.4 ± 3.8) and bladder outlet obstruction group (19.34 ± 4.9).

IPSS Voiding Subscore were also highest in the same groups Storage Symptoms and thus a higher IPSS Storage Subscore was seen in patients with detrusor underactivity (10.4 ± 4.5), inflammatory pathologies (8.9 ± 3.9) and with overactive bladder (8.45 ± 2.5).

The IPSS V/S Score ratio was highest for patients with bladder outlet obstruction (1.29 ± 0.68) pointing towards predominance of voiding symptoms and less of storage symptoms. It neared 1 with inflammatory pathologies (1.06 ± 0.74). Overactive bladder patients had more of storage symptoms as suggested by a score ratio of 0.85 ± 2.65

The statistical test *ANOVA was used to analyze the values and the p value was found to be < 0.05 and significant for each score.

Figure 4: IPSS score



This chart depicts the graphical representation of the analyzed IPSS Score. Voiding symptoms were predominant in bladder outlet obstruction, detrusor underactivity and stress urinary incontinence. Storage symptoms predominated in patients with overactive bladder and inflammatory pathologies.

Table 5: Quality of Life Assessment

Diagnosis	Quality of Life
Overactive bladder	3.45 ± 0.76
Detrusor underactivity	4.23± 0.55
Bladder outlet obstruction	5.12 ± 0.63
Inflammatory	5.98 ±.87
Stress urinary incontinence	4.12 ± 0.47
P value*	**0.54**

The quality-of-life score was also assessed for each of the diagnoses. It was found that patients with inflammatory pathologies had worse quality of life in comparison to other diagnoses, (5.4 ± 0.87) as compared to other diagnosis. The statistical test * ANOVA was applied and it did not show any significant difference in Quality of Life among various diagnoses.

Figure 5: Quality of Life Assessment

Below is graphical representation of the same data

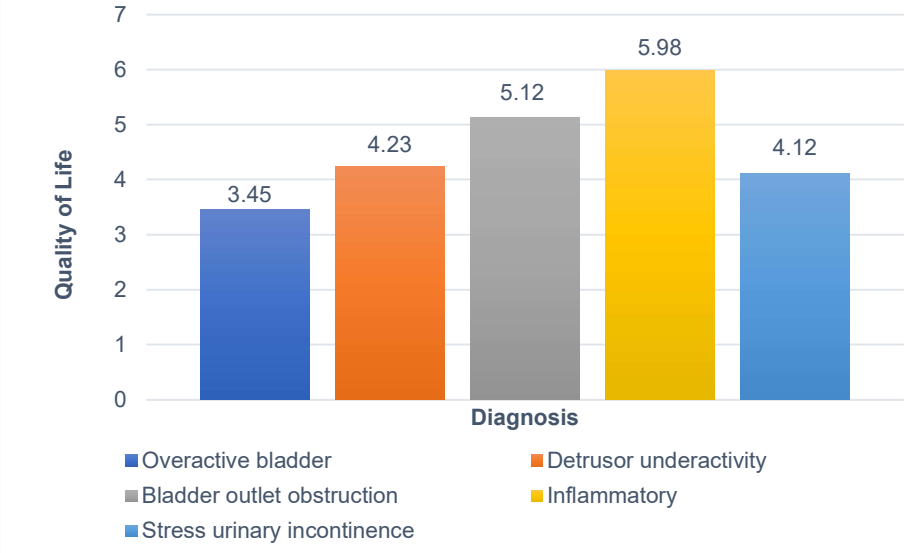


Table 6: Hormonal Status

Diag.	Post-Menopausal (n= (61)	Premenopausal (n= 39)	Chi-square	
			X^2 value	P value
OAB	14 (58.33 %)	10 (41.67 %)	0.094	0.756
DUA	19 (82.61 %)	4 (17.39 %)	5.863	0.015
BOO	28 (60.87 %)	18 (39.13 %)	0.0 1	0.980
INFLM.	5 (50.00 %)	5 (50.00 %)	0.122	0.727
SUI	12 (70.59 %)	5 (29.41 %)	0.792	0.374

In the present study 61% of the patients were post-menopausal and 39% were pre-menopausal. Bladder outlet obstruction was the most common pathology in both groups (45.9% and 46.1%). Detrusor underactivity was more common (82.6%) in post-menopausal women and this result was found to be significant (<0.05). Other pathologies did not show any significant correlation with hormonal status. Inflammatory pathologies were equally common in both groups.

Figure 6: Hormonal Status

Below is graphical representation of the same data

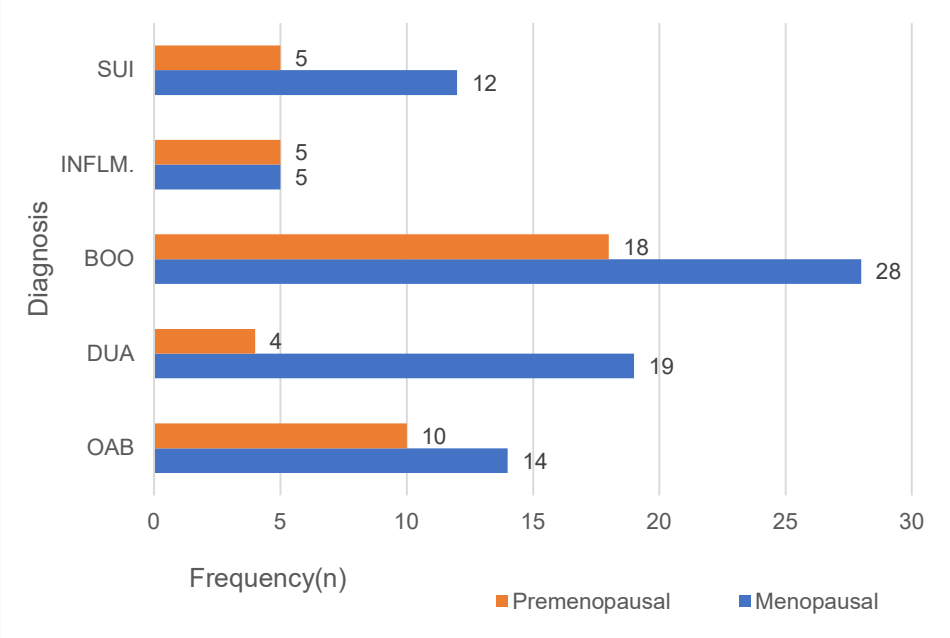


Table 7: Diabetes Mellitus

Diag.	Diabetic (n= 35)	Non-Diabetic (n= 65)	Chi-square	
			X^2 value	P value
OAB	9 (37.50%)	15 (62.50%)	0.087	0.768
DUA	14 (60.87%)	9 (39.13%)	8.787	0.003
BOO	16 (34.78%)	30 (65.22%)	0.002	0.966
INFLM.	3 (30.00%)	7 (70.00%)	0.122	0.727
SUI	0 (0.00%)	17 (100.00%)	11.029	0.001

Another important parameter was the presence or absence of diabetes. It was found that 35% of the patients were diabetic in the present study. DUA (60.87%) was more prevalent among diabetics while BOO was most common among non-diabetics (60.87%). DUA and SUI showed a significant association with diabetes (p value <0.05) with DUA more prevalent in diabetics and SUI more prevalent in non-diabetics.

Figure 7: Diabetes Mellitus

Below is graphical representation of the same data

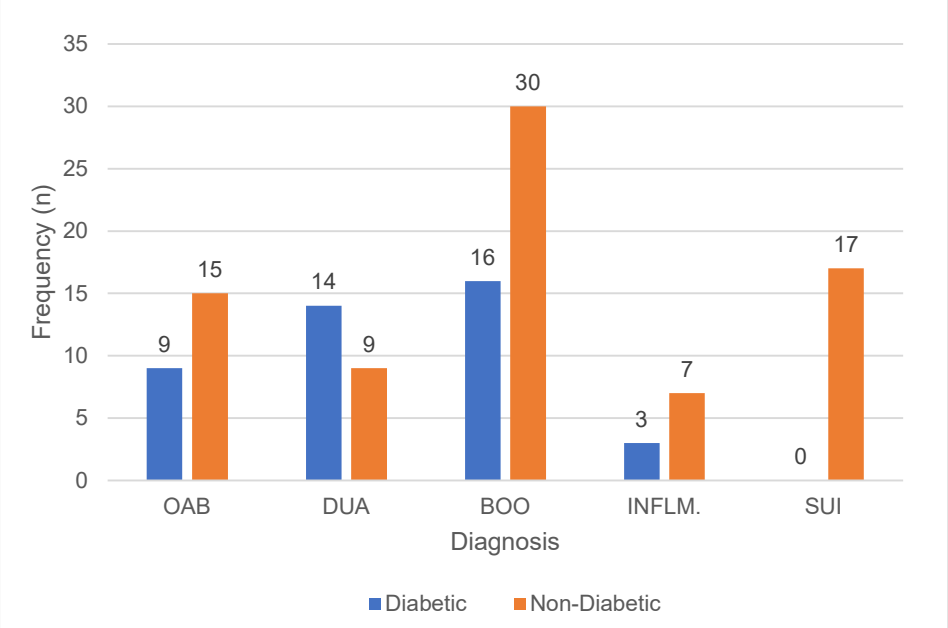


Table 8: History of Neurological disease

Diag.	Neurological Diseases						Chi-square	
	Present (n= 22)					Ab. (n= 78)	X^2 value	P value
	Alzh	CVA	PIVD	Scol-iosis	Spin-eSx			
OAB	1	0	4	1	1	17	11.2	0.08
DUA	1	1	4	0	1	16	8.2	.223
BOO	0	0	8	0	1	37	21.8	.001
INFLM	0	0	0	0	0	10	5.8	.437
SUI	2	1	3	0	3	8	32.3	.000

History of neurological diseases was present in 22% of patient with a history of voiding dysfunction. Posterior intervertebral disc prolapse (PIVD) was most prevalent and was most often associated with presence of BOO. SUI was more common in patients who had a history of neurological disease. It was the most common diagnosis in those with Alzheimer's disease and previous spinal surgery.

Figure 8: History of Neurological disease

Below is graphical representation of the same data

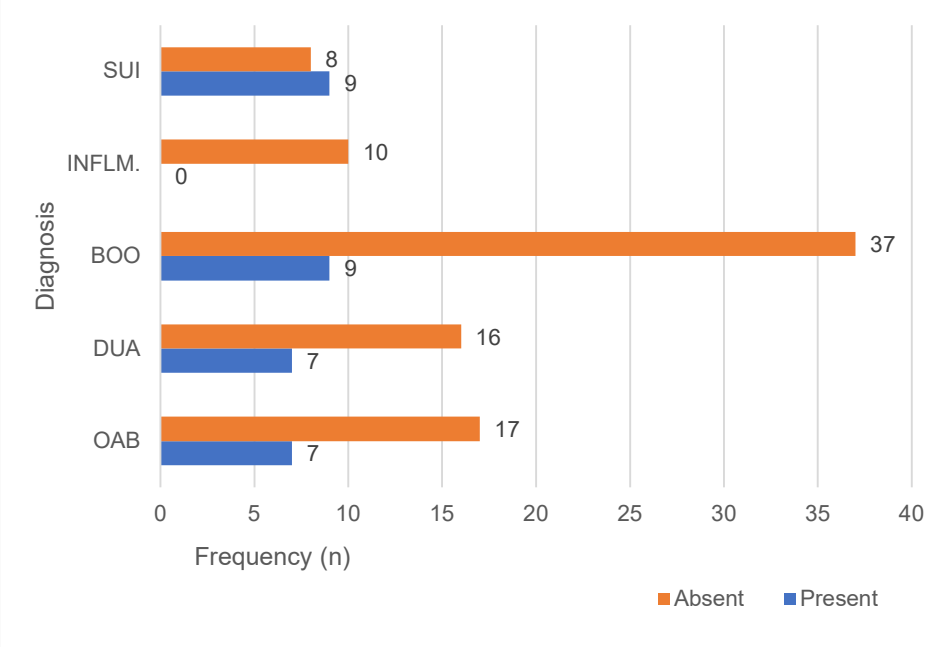


Table 9: History of Urological / Gynecological Surgery

Diag.	History of Uro / Gynec Surgery						Ab.(n =61)	Chi-Square	
	Present (n= 39(39%))								
	CA UB	CPE	Forc -eps	Hyster-ectomy	LS CS	Vagin-oplasty		X^2	P
OAB	0	8	0	0	2	0	14	19.8	0.07
DUA	0	0	0	6	3	0	14	21.8	0.04
BOO	0	6	1	10	7	1	21	32.2	0.01
INFLM	3	0	0	1	4	0	2	39.2	0.01
SUI	0	0	1	2	4	0	10	15.1	0.23

About 40 % of patients of Voiding Dysfunction have had some form of previous urological or gynecological intervention. Most common of these were previous hysterectomies or lower segment caesarian section (LSCS). Inflammatory Pathologies and Bladder Outlet Obstruction were significantly more common in patients who have had a procedure previously (p value <0.05).

Figure 9: History of Urological / Gynecological Surgery

Below is graphical representation of the same data

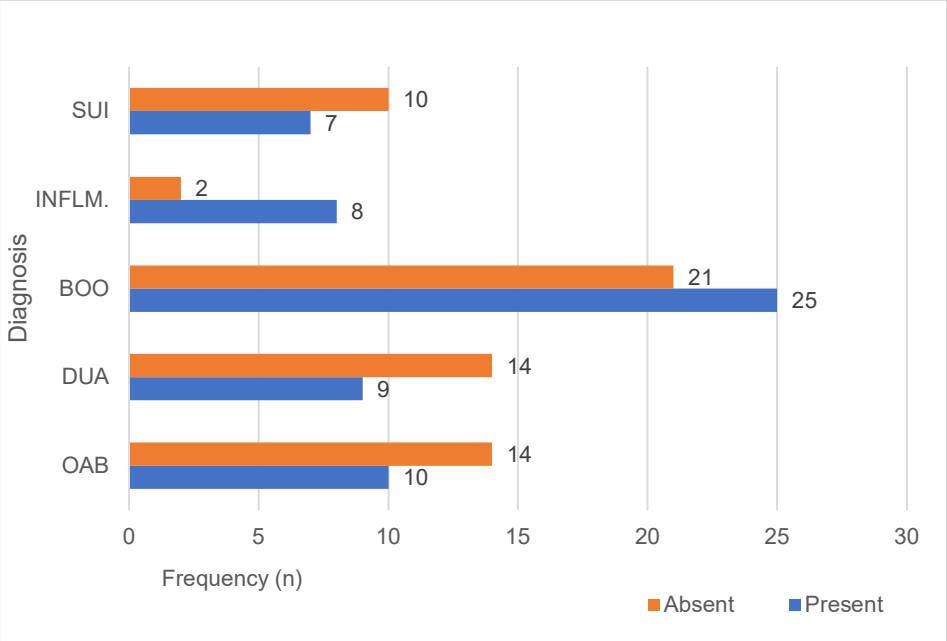


Table 10: History of Recurrent Urinary Tract Infection (UTI)

Diagnosis	Recurrent UTI		Chi-Square	
	Present (n=64)	Absent (n=36)	X^2	P
OAB	20 (83.33 %)	4(16.67 %)	7.51	0.023
DUA	18 (78.26 %)	5 (21.74 %)	5.71	0.057
BOO	32 (69.57 %)	14 (30.43 %)	17.24	0.01
INFLM.	5 (50.00 %)	5 (50.00%)	2.34	0.98
SUI	12 (70.59%)	5 (29.41 %)	5.56	0.06

Voiding Dysfunction was often associated with a history of recurrent UTI in 64% of women. Such history was least common those with chronic inflammatory pathologies (7.8%). It was significantly associated with patients having Bladder Outlet Obstruction and Overactive Bladder (p value <0.05).

Figure 10: History of Recurrent UTI

Below is graphical representation of the same data

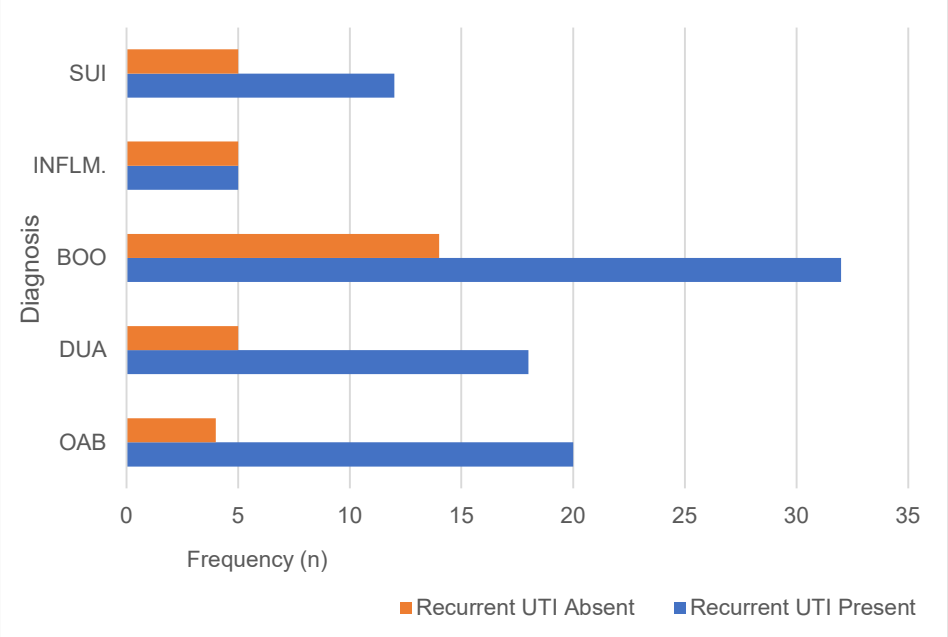


Table 11: Ultrasonography Findings

Diagnosis	USG PVRU (ml)
Overactive bladder	48.5 ± 22.3
Detrusor underactivity	210.4 ± 109.2
Bladder outlet obstruction	83.5 ±30.4
Inflammatory pathologies	187.6 ±62.6
Stress urinary incontinence	160.44 ± 80.3
P value (One-way ANOVA)	0.001

The USG parameters were also analyzed in the study population. The various diagnoses were compared with for post void residual volume of urine (PVRU) and it was found to be maximum in cases with detrusor underactivity (210.4 ± 109.2). Using statical test ANOVA, a significant difference was found between PVRU in various diagnosis.

Figure 11: Ultrasonography Findings

Least PVRU was seen in Overactive Bladder (48.5 ± 22.3), and most in Detrusor Underactivity (210.4 ± 109.2)

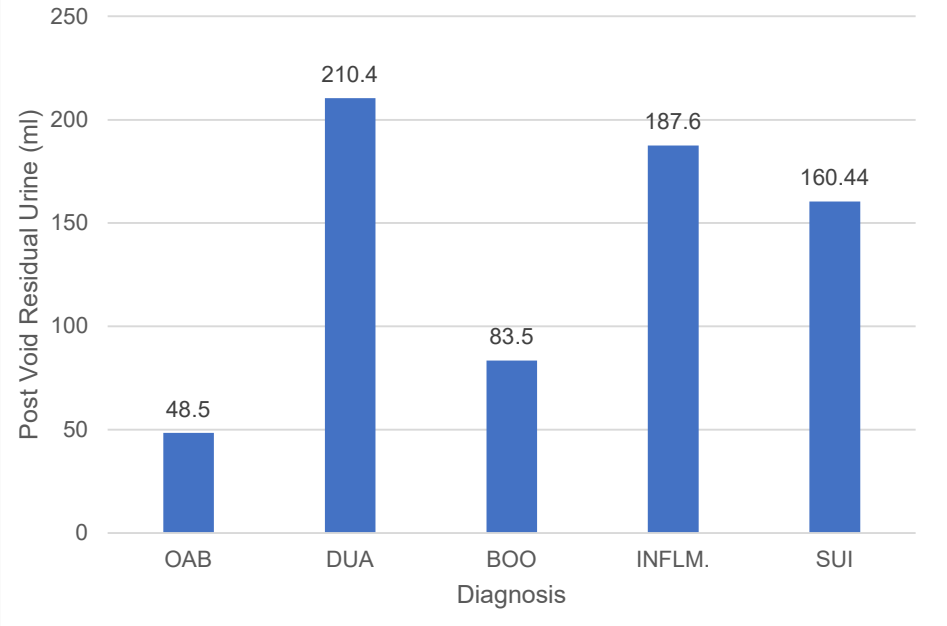


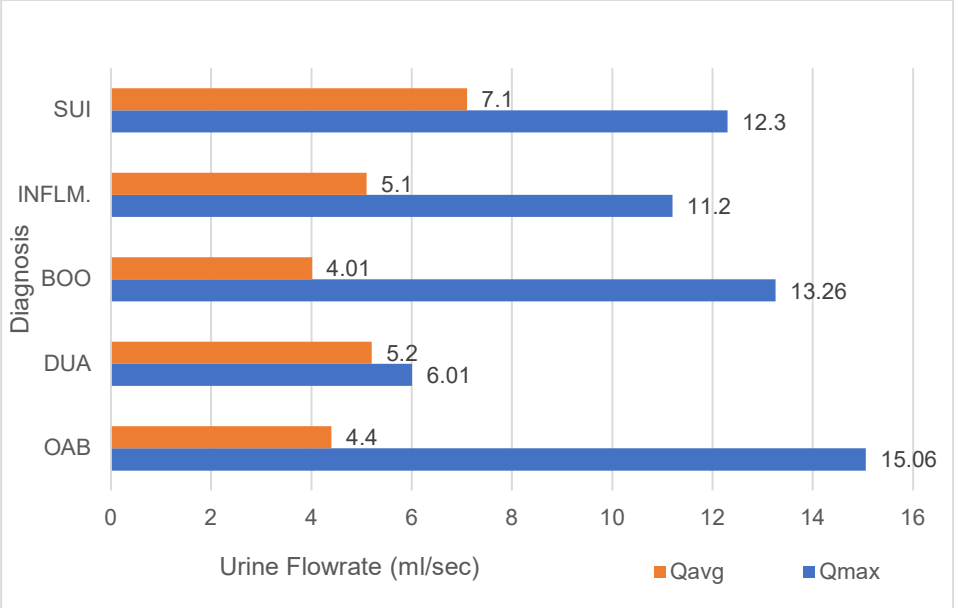
Table 12: Urine Flowmetry Analysis

Diagnosis	Qmax	Qavg
OAB	15.06 ± 6.3	4.4 ± 2.2
DUA	6.01 ± 2.32	5.2 ± 1.2
BOO	13.26 ± 5.5	4.01 ± 1.01
INFLM.	11.2 ± 4.01	5.1 ± 1.8
SUI	12.3 ± 7.0	7.1 ± 2.2
P value (One-way ANOVA)	0.034	0.031

The Urine Flowmetry and comparison between the various diagnoses was done. The two important components, peak flow rate (Qmax) and average flow rate (Qavg) were analyzed which showed significant difference between the various diagnosis (<0.05) using ANOVA test.

Figure 12: Urine Flowmetry analysis

Peak flow rates were poorest in patients with Detrusor Underactivity (6.01 ± 2.32) and were least affected in those with Overactive Bladder (15.06 ± 6.3)



Urodynamic Study Parameters

The Urodynamic Study Parameters were evaluated for various diagnoses. It was found using ANOVA that there was significant difference between various parameters for each diagnosis.

Table 13: Total Bladder Capacity

Diagnosis	Total Bladder Capacity
Overactive bladder	300.03 ± 134.2
Detrusor underactivity	437.08 ± 167.3
Bladder outlet obstruction	260.66 ± 114.2
P value	**0.043**

Patient with Detrusor Underactivity had the maximum mean bladder capacity (300.03 ± 134.2). Those with Bladder Outlet Obstruction had the least mean bladder capacity (260.66 ± 114.2). There was a significant difference between intergroup measurements (p value 0.043).

Figure 13: Total Bladder Capacity

Below is a graphical representation of the same data

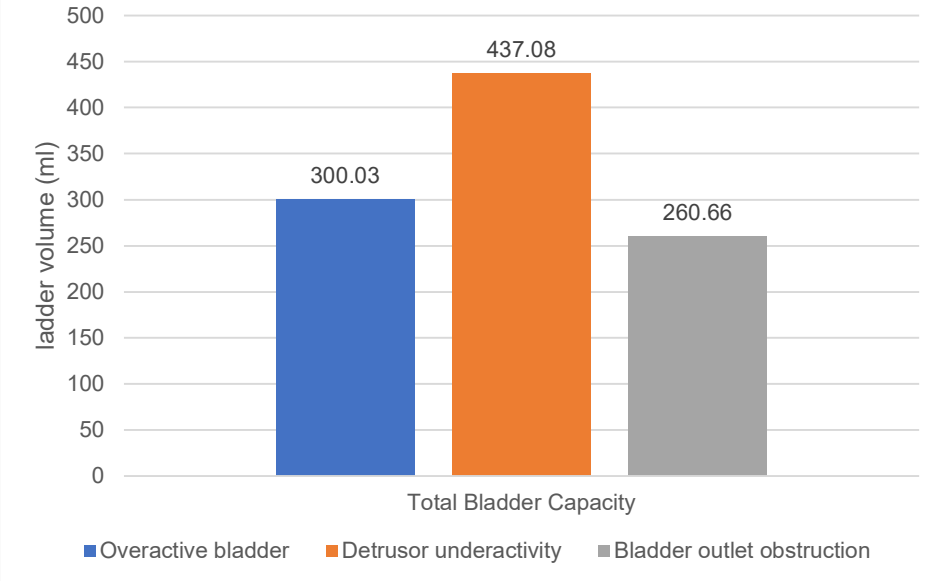


Table 14: Bladder Compliance

Diagnosis	Bladder Compliance
Overactive bladder	40.67 ± 21.21
Detrusor underactivity	32.54 ± 10.4
Bladder outlet obstruction	48.08 ± 23.4
P Value	**0.056**

Urinary bladder compliance was least in patients with Detrusor Underactivity (32.54 ± 10.4). mean bladder compliance in patients with Bladder Outlet Obstruction was 48.08 ± 23.4 and in Overactive Bladder was 40.67 ± 21.21. Statistical test ANOVA was applied which did not show a significant difference between various groups.

Figure 14: Bladder Compliance

Below is a graphical representation of the same data

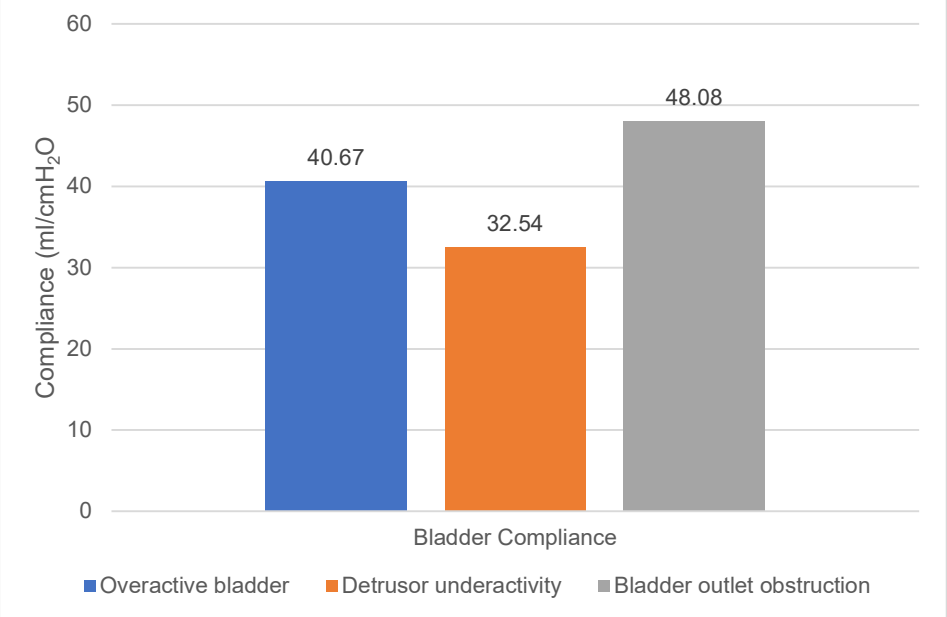


Table 15: Maximum Detrusor Pressure

Diagnosis	Maximum Detrusor Pressure
Overactive bladder	20.63 ± 12.8
Detrusor underactivity	3.8 ± 1.8
Bladder outlet obstruction	26.78 ± 13.0
P Value	**0.001**

Maximum detrusor pressure at peak flow rate was compared between groups. Those with Detrusor Underactivity had the least recorded mean Pdet Qmax (3.8 ± 1.8). patients with Overactive Bladder had a mean of 20.63 ± 12.8. while those with Bladder Outlet Obstruction had the maximum Pdet Qmax (26.78 ± 13.0). Using statistical test ANOVA, a significant difference was found between various groups.

Figure 15: Maximum Detrusor Pressure

Below is a graphical representation of the same data

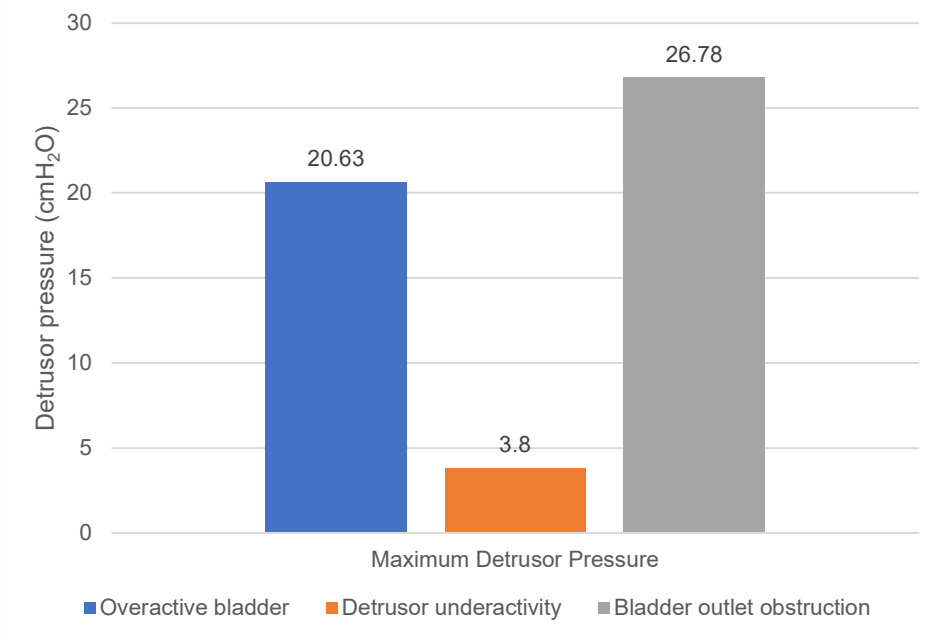
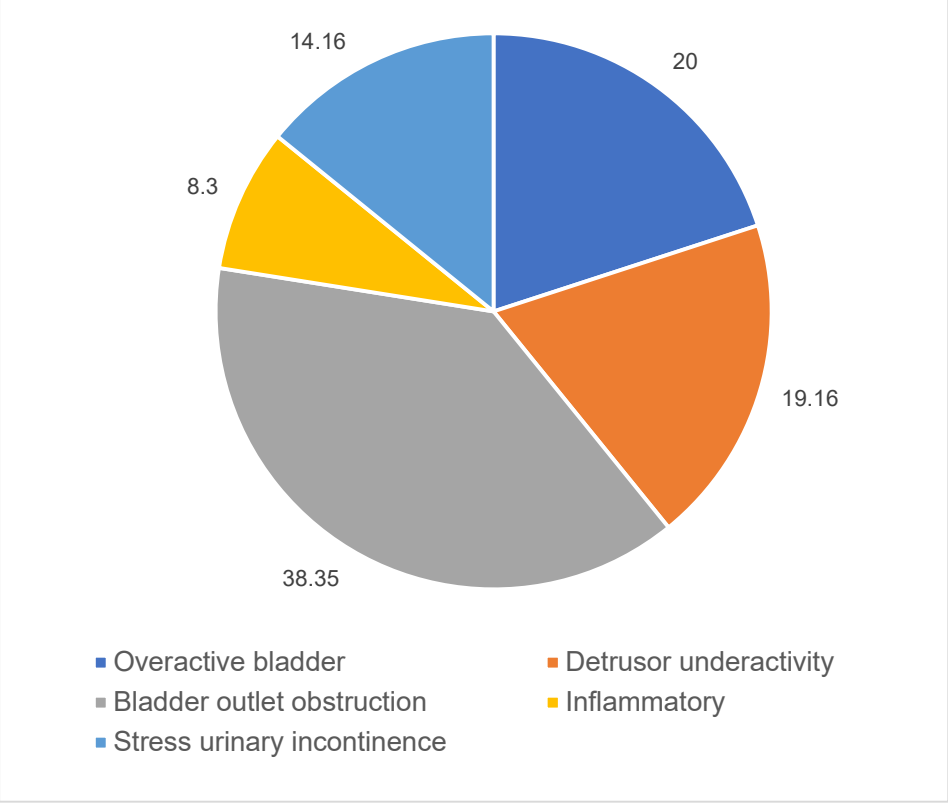


Table 16: Distribution of Voiding Dysfunctions in study Population

Diagnoses	Frequency (%)
Overactive Bladder	24 (20%)
Detrusor Underactivity	23 (19.16%)
Bladder Outlet Obstruction	46 (38.35%)
Inflammatory Pathology	10 (8.3%)
Stress Urinary Incontinence	17 (14.16%)

In the present study population, around 38% patients had bladder outlet obstruction followed by overactive bladder (20%) and Detrusor Underactivity (19%). Voiding Dysfunction was least common In Inflammatory disorders (8%). It is also pertinent to note that often there were more than one diagnosis considered for a single patient.

Figure 16: Distribution of Voiding Dysfunctions in study Population



DISCUSSION

Lower urinary tract symptoms (LUTS) have traditionally been linked to prostatic disease in men and overactive bladder in women. Female voiding disorders have not received much attention due to a lack of definitions, diagnostic criteria, and treatment guidelines. Urologists frequently encounter women complaining of voiding difficulties without any obvious urinary tract infection who go undiagnosed and thus do not receive appropriate treatment.

The present study was designed as a prospective, single-center study to identify the causes of voiding dysfunction in women above 18 years of age and to study the various factors associated with voiding dysfunction. Women with lower urinary tract symptoms and IPSS score of more than 7, were selected for the study. After clearance from institutional ethical committee and informed written consent, eligible candidates were taken up for this study. Similar studies on these subjects had a similar design and methods followed.[19]

Age distribution

The age-wise distribution of the patients showed that mean age of the study population was 54.4 ± 16.8 years. Of these, patients 61 to 70 years of age were most affected (32%) and Bladder outlet obstruction as the most common diagnosis in almost all age groups. Similar age distribution has been seen in previous studies, with the incidence of Bladder Outlet Obstruction as the most prevalent cause of female lower urinary tract symptoms.[19] Least affected were those 21-30 years of age, in whom voiding difficulties were mostly attributed to overactive bladder. At the other extreme, in those above 70 years of age, detrusor under activity was the most common diagnosis.

International Prostate Symptom Score

The recorded IPSS score along with IPSS-V, IPSS-S and IPSS-V/S sub-scores were assessed. The appropriate statistical test, ANOVA was used to analyze the values and the p value was found to be <0.05.

Choi YS et al. [19] found that mean total IPSS score, mean IPSS sub scores for voiding and storage symptom was 19.5 ± 7.9, 12.0 ± 5.0, and 8.4 ± 3.4, respectively [19] in a prospective multicenter trial. Results from our showed comparable data with a mean total IPSS score of 19.6 ± 4.9, mean Voiding Subscore of 10.8 ± 4.2 and a mean Storge Subscore of 8.8 ±3.18.

Total IPSS score: The score was highest for patients with Bladder outlet obstruction, with 20.33 ± 5.9 as the mean value of these patients which is significantly higher from the other patient groups. Stress urinary incontinence group had the least Total IPSS score of 11.5 ± 6.7.

IPSS-V score was highest for patients with Detrusor underactivity (13.4 ± 3.6) and bladder outlet obstruction (12.3 ± 5.7), correlating with such patients complaining of poor urinary stream, hesitancy and incomplete emptying of bladder most commonly. Patients with overactive bladder had the least voiding symptoms with a score of 5.3 ± 1.8.

IPSS-S score, thus storage symptoms like frequency and urgency were most commonly seen in patients with detrusor underactivity (9.4 ± 4.6), overactive bladder (8.9 ± 2.5) and bladder outlet obstruction (8.1 ± 3.5). Storage symptoms were least common in patients with stress urinary incontinence (4.6 ± 1.8.).

IPSS-V/S ratio: Hasio SM et al [20] found that IPSS-V/S of ≥1.33 had the best predictive value for female voiding symptoms with a high negative predictive value (97.4 %). Among study population, those with Stress urinary incontinence (1.6 ± 0.34) had the highest score suggest maximum deviation from normal voiding. It was least for women with Overactive bladder (.85 ± 2.4).

Quality of Life

The IPSS modification added the QoL component which considers patient's emotional component, enhancing its utility. [40] This component was used to assess the effect of Voiding Dysfunction on patients Quality of life.

It was assessed for each of the Voiding Dysfunction and there was significantly lower quality of life in patients with Inflammatory pathologies (5.4 ± 0.87) as they have a prolonged natural history of disease, as compared to other diagnosis. The appropriate statistical test ANOVA was applied to analyze group's variability. Quality of life was least affected for patients with overactive bladder (3.2 ± 0.76).

Age, and thus associated comorbidities may confound the above results. Overactive bladder, mostly seen in younger years, causes the least disturbance in quality of life. While inflammatory pathologies along with stress urinary incontinence, bladder outlet obstruction and detrusor underactivity, being more prevalent in later years are associated with poorer scores.

Hormonal status

In the present study 61% of the patients were post-menopausal and 39% were pre-menopausal. Detrusor underactivity was most prevalent diagnosis in post-menopausal women, followed by overactive bladder. Inflammatory pathologies were more common in pre-menopausal women as was bladder outlet obstruction.

Grodstein et al. [41] followed 7,555 women (50–75 years) longitudinally from 1976 concluded that there was correlation with reduced estrogen and increased incidence of LUTS symptoms in post-menopausal women.

In a study by Grady et al. [42] where LUTS was treated with hormone replacements (in 1,525 women, <80 years with coronary disease) incontinence improved in 26% in placebo arm compared to 21% in treatment arm. 27% of the placebo arm had worsening incontinence compared to 39% in the treatment arm.

In animal studies by Chung et al. [43] had concluded that oestrogen replacement therapy may improve detrusor contractility in ovariectomized rats. Similar results have also been shown in rodent studies by Zhu et al. [44]

Diabetes Mellitus

History of diabetes with associated diabetic cytopathy forms an important cause of detrusor weakness. Diabetic Cystopathy (DC), which is defined as a triad of diminished bladder feeling, increased bladder capacity, and impaired bladder emptying.[29] Of all the study participants, 35% had a history of diabetes. Ueda et al. [57] examined 53 'asymptomatic' diabetic patients and found on careful questioning that 21 (40%) complained of voiding symptoms.

Bladder outlet obstruction was the most common diagnosis in diabetic as well as the non-diabetic patients among the various voiding dysfunctions. Inflammatory causes showed least number of patients with voiding dysfunction in the non-diabetic population.[45] A common consequence of diabetes is DC, according to our findings, may cause a variety of LUTS in women. Diabetic Cystopathy is characterized by a wide range of clinical symptoms and urodynamic data, ranging from an Overactive Bladder to a bladder that is poorly contractile.

The most frequent endocrine condition that affects bladder or voiding function is diabetes mellitus. Peripheral neuropathy is a complication of diabetes that affects bladder contractility, resulting in urine retention or partial bladder emptying. Hypothyroidism can have a similar effect on the bladder.[46]

History of Neurological disease

Most of the study population did not have any neurological disease (78%). Among those who did, PIVD was most prominent (n=13). Least prevalent were scoliosis and history of cerebrovascular accident. The prevalence of neurological disease was not found to significantly affect the incidence of voiding dysfunction in the current study patient population.

Paniker et al. also found that voiding dysfunction are common in neurological patients and have pronounced effect on quality of life. The high prevalence of dysfunction reflects the wide distribution of neural

control of lower urinary tract functions. Site and nature of the neurological lesion influence the pattern of dysfunction. [56]

Patients with neurological illnesses, such as multiple sclerosis (MS) or other pathologies of spinal cord, may experience voiding dysfunction as well. Urinary dysfunction affects more than 80% of MS patients, and this number rises to 96 percent when the disease has been present for more than ten years. [47]

Women with dementia (Alzheimer's disease), may have problems voiding. Changes in the frontal lobe of the brain can affect decision-making, leading in improper voiding or a failure to recognize the need to void, resulting in urine retention. Memory is impaired in temporal lobe pathologies; the patient may not identify a toilet or what it is used for and may forget how to void.

History of urological gynecological intervention

Several risk factors for post-operative voiding dysfunction have been found by Wang et al. [49] which include Age over 65 years, Additional surgical procedures, Type of surgical procedure, post-operative cystitis, pre-operative acontractile bladder, Excessive elevation of the bladder neck, Menopausal status, Abnormal pre-operative voiding studies and pre-operative enterocoele or vault prolapse

In our study 39% had a history of undergoing previous urological or gynecological procedure. Such association was most significant with Inflammatory pathologies (p-value <0.01) and with Bladder Outlet Obstruction (p-value <0.01). Prolapse correction and/or incontinence surgery can itself result in voiding dysfunction. While botulinum toxins injections have been effectively utilized to treat female voiding dysfunction, one of the potential side effects of this procedure is the continuation of voiding dysfunction, particularly urine retention. Any anti-incontinence procedure can result in edema, urinary infection, kinking or compression of the urethra. This may lead to short-term or long-term Voiding Dysfunction.

History of recurrent urinary tract infections

The prevalence of recurrent UTI was 64% in the study patient population, 36% had no previous history of recurrent UTI. Lee PJ et al. [58] found Storage and voiding dysfunctions in 90% patients in their study. Such history was significantly associated with Bladder Outlet Obstruction (69.57%, p value 0.01) and Overactive Bladder (83.33%, p value 0.02). those with inflammatory pathologies most often had negative urine cultures previously.

Ultrasonographic Parameters

Ultrasonography of kidney, ureter and bladder with postvoid residual urine was done for all patients. The findings in various voiding dysfunctions were compared using one way ANOVA and showed a significant difference with p value of 0.001. In cases with detrusor underactivity (221.4 ± 103.2) the USG PVR was significantly higher as compared to other diagnoses. Similar results were seen in larger studies comprising over 19000 patients in the study population. [50]

Uroflowmetry Study

To come to a diagnosis for the voiding dysfunction it was necessary to perform a Uroflowmetry, and Urodynamic Study where it was indicated. The Uroflowmetry parameters, peak flow velocity (Qmax) and average flow velocity (Qavg), were compared in the study population and showed significant difference between various diagnoses (p value 0.034, 0.031 respectively). Peak flow rates were poorest in patients with Detrusor Underactivity (6.01 ± 2.32) and were least affected in those with Overactive Bladder (15.06 ± 6.3).

Costantini, E. et al. [59] found that uroflowmetry has good specificity and validity as a screening test. When results were abnormal, they recommend further investigation with a pressure-flow study for the deferential diagnosis between obstruction, hypocontractility and overactivity.

Urodynamic Study

Whether the decrease in Qmax was related to Bladder Outlet Obstruction or poor bladder contractility can be distinguished by pressure-flow study. To assess the contractility of the bladder, parameters as defined by Abrams et al. are frequently used. [51,52]

The Urodynamic components like total bladder capacity, maximum detrusor pressure and bladder compliance were compared. This was analyzed using ANOVA which showed a significant difference between various diagnoses.

In previous studies, women were classified as having Detrusor Underactivity when peak flow velocity (Qmax) was 12 ml/s or less with a detrusor pressure at maximum flow (Pdet Qmax) 10 cm H_2O or less and with Bladder Outlet Obstruction when their Qmax was less than 12 ml/s and their Pdet Qmax was greater than 25 cm H2O, Defreitas et al. [52], Gotoh et al. [53]

In our study Total Bladder Capacity was maximum for patients with Detrusor Underactivity (437.08 ± 167.3) and least for those with Bladder Outlet Obstruction (260.66 ± 114.2). these values showed a significant inter group variability (p value 0.043)

Maximum detrusor pressure showed a significant difference (p value 0.001) between Overactive Bladder (20.63 ± 12.8), Detrusor Underactivity (3.8 ± 1.8) and Bladder Outlet Obstruction (26.78 ± 13.0). Bladder compliance did not show a significant difference in various groups.

Distribution of various LUTS in study Population

In the present study population, most (42%) patients had bladder outlet obstruction followed by overactive bladder (24%) and similar frequency was also found for the Detrusor underactivity (23%). The prior research on female LUTS has mainly focused on urinary storage diseases such Overactive Bladder. With various novel diagnostic and therapeutic procedures, research on female voiding problems is gathering more attention.

Bladder overactivity, reduced bladder compliance, lower bladder outlet resistance, aging, or a combination of factors can cause bladder filling and storage dysfunctions. Reduced bladder contractility, increased bladder outlet resistance, or more of those factors may contribute to voiding dysfunction.

In the present study population 42% patients had bladder outlet obstruction. These maybe due to meatal stenosis, kinking of urethra by cystocele, labial adhesions or numerous other causes. As voiding dysfunctions in women are less commonly reported than stress urine incontinence, detrusor instability, or pelvic organ prolapse, they are frequently neglected, and their prevalence is not accurately known.

Our study brings forth Bladder Outlet Obstruction as the most common cause of VD in women. This is followed by Overactive Bladder and Detrusor Underactivity. Stress Urinary Incontinence and Inflammatory Pathology were least prevalent in the study population.

Of these, Bladder Outlet Obstruction was significantly less prevalent in those with a history of neurological disease and more prevalent in those with history of recurrent UTI. Overactive Bladder was significantly more common in those with a history of recurrent UTI. Detrusor Underactivity was more prevalent in post-menopausal women, those with diabetes mellitus and history of recurrent UTI. Inflammatory Pathology were mostly seen in those women who had undergone a urological of gynecological procedure beforehand.

Female voiding dysfunctions have less defined symptoms.[54] As a result, it is critical to evaluate patients for voiding dysfunction and form a diagnosis for effective treatment. This helps avoid long term complications and improve Quality of Life in such patients.

SUMMARY

Voiding Dysfunction in women are an important cause of morbidity and mortality worldwide. They are often overlooked due to the lack of clear definitions, diagnostic criteria, and treatment guidelines.

This study intended to identify the causes and thus help treat voiding dysfunction in women. Consequentially it would help improve quality of life scores and avoid long term morbidity in these patients.

A total of 100 women with voiding dysfunction were evaluated over the last two years. Subjective complaints of various lower urinary tract symptoms at their effect on Quality of life was recorded via IPSS Questionnaire. An ICIQ-UI-SF Questionnaire was used to document Stress Urinary Incontinence.

Data was collected and analyzed regarding hormonal status, diabetes, history of neurological disease, history of urological or gynecological intervention and history of recurrent Urinary tract Intervention.

Patients were evaluated with ultrasonography, uroflowmetry and urodynamic study as indicated. A POPQS score was assessed for women with findings suggestive of cystocele. Collected data was analyzed using SPSS version 21 for Microsoft Windows.

Most common cause of Voiding dysfunction in these women was found to be Bladder Outlet Obstruction (46%), followed by Overactive Bladder (24%) and Detrusor Underactivity (23%). Least common causes included Stress Urinary Incontinence (17%) and other Inflammatory Pathologies (10%).

Mean age of women in study was 54.4 ± 16.8 years. OAB was most common in younger ages. In all other age groups, BOO was the most common pathology, except in women more than 71 years of age, in whom, DUA was most common.

Analysis of IPSS Score showed that Voiding symptoms were predominant in BOO, DUA and SUI. Storage symptoms predominated in patients with OAB and inflammatory pathologies. Also, IPSS score

and its sub-scores showed a significant difference amount various diagnosis. Quality of life was almost equally affected in all patients with voiding dysfunction.

Detrusor Underactivity had significant association with menopausal status of women. Other diagnosis did not show a significant association. Presence of diabetes showed a significant associated with Detrusor Underactivity and Stress Urinary Incontinence. Other diagnoses did not show any significant difference.

History of neurological diseases was present in 22% of patient with a history of voiding dysfunction. SUI was more common in patients who had a history of neurological disease. It was the most common diagnosis in those with Alzheimer's disease and previous spinal surgery. Inflammatory Pathologies and Bladder Outlet Obstruction were significantly more common in patients who have had a urological or gynecological procedure previously. A history of recurrent UTI showed significant association with patients having Bladder Outlet Obstruction and Overactive Bladder.

Post Void Residual Urine showed a significant difference among various diagnoses.it was maximum in cases with DUA. Similarly, on uroflowmetry peak and average flow velocities had significant association with various diagnosis.

CONCLUSION

Early management of Voiding Dysfunction is aimed at achieving two goals. Firstly, to reduce lower urinary tract symptoms and thus improving quality of life. Secondly, to reduce the risk of disease progression in terms of symptoms and/or complications such as acute urinary retention, deterioration of renal function or need for intervention.

Institution of appropriate therapy needs an accurate diagnosis. Therefore, it is essential to identify the causes of voiding dysfunction in women. Correlating various factors associated with voiding dysfunction evaluated herein help guide the working diagnosis in the appropriate direction. Investigational parameters analyzed in our study aid in establishing the final diagnosis and deliver pertinent treatment.

Whilst it is recognized that increasing severity and progression of symptoms have a significant impact on the quality of life, it is difficult to predict which individuals are at risk. This study we have attempted to establish the prevalence of various causes of voiding dysfunction in women and evaluated demographic parameters and investigational variables that assist developing such diagnosis.

LIMITATIONS

Present study was conducted over a span of eighteen months with 100 women who presented with voiding complaint to our institution.

A similar study at community level would be able to access women who are unable to avail healthcare facilities and thus finding actually prevalence of various pathologies in the general population.

Studies with similar design and longer follow up can help up identify the effect of factors such as diabetes, menopause etc. on patients having preexisting voiding dysfunction and also follow up the response to various therapeutic options.

A multicentric study with larger study population and longer follow up would greatly befit our knowledge of voiding dysfunction in women.

REFERENCES

1. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, et al. The standardisation of terminology of lower urinary tract function: report from the Standardisation Sub-committee of the International Continence Society. American Journal of Obstetrics & Gynecology. 2002;187:116-26.
2. Massey JA. Obstructed voiding in the female. BJU Int.1988;61:36-9.
3. Haylen BT, Krishnan S, Schulz S, Verity L, Law M, Zhou J, Sutherst J. Has the true prevalence of voiding difficulty in urogynecology patients been underestimated?. International Urogynecology Journal. 2007;18:53-6.
4. Haylen BT. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. Int Urogynecol J. 2010;21:5-26.
5. Abdel Raheem A, Madersbacher H. Voiding dysfunction in women: How to manage it correctly. Arab journal of urology. 2013;11:319-30.
6. Morrison JFB, Torrens MJ. Neurophysiology. In: Stanton SL, Monga AK, editors. Clinical urogynaecology. London: Churchill Livingstone; 2000.
7. Nikpoor P, Karmakar D, Dwyer P. Female Voiding Dysfunction: a Practical Approach to Diagnosis and Treatment. Current Obstetrics and Gynecology Reports. 2018;7:74-83.
8. Chen GD, Lin LY, Wang PH, Lee HS. Urinary tract dysfunction after radical hysterectomy for cervical cancer. Gynecologic oncology. 2002;85:292-7.
9. Sountoulides P, van Dijk MM, Wijkstra H, de la Rosette JJ, Michel MC. Role of voiding and storage symptoms for the quality of life before and after treatment in men with voiding dysfunction. World journal of urology. 2010;28:3-8.

10. Moller CF. Diabetic cystopathy. I: A clinical study of the frequency of bladder dysfunction in diabetics. Danish medical bulletin. 1976;23:267-78.
11. Zhu Q, Ritchie J, Marouf N, Dion Sb, Resnick Nm, Elbadawi A, et al. Role of ovarian hormones in the pathogenesis of impaired detrusor contractility: evidence in ovariectomized rodents. The Journal of urology. 2001;166:1136-41.
12. Buntzen S, Nordgren S, Delbro D, Hulten L. Anal and rectal motility responses to distension of the urinary bladder in man. International journal of colorectal disease. 1995;10:148-51.
13. Doumouchtsis SK, Jeffery S, Fynes M. Female voiding dysfunction. Obstetrical & gynecological survey. 2008;63:519-26.
14. Stanton SL, Ozsoy CA, Hilton PA. Voiding difficulties in the female: prevalence, clinical and urodynamic review. Obstet Gynecol. 1983;61:144-7.
15. Irwin DE, Milsom I, Hunskaar S, Reilly K, Kopp Z, Herschorn S, et al. Population-based survey of urinary incontinence, overactive bladder, and other lower urinary tract symptoms in five countries: results of the EPIC study. European urology. 2006;50:1306-15.
16. Ng SC, Hu SW, Chen GD. A community-based epidemiological survey of overactive bladder and voiding dysfunction in female Taiwanese residents aged 40 years and above. Taiwanese Journal of Obstetrics and Gynecology. 2017;56:811-4.
17. Moossdorff-Steinhauser H, Rademakers KL, Nieman F, van Koeveringe GA, Berghmans B. A survey on voiding complaints in women presenting at a Pelvic Care Center. Current urology. 2019;13:31-6.
18. Ku JH, Jeong IG, Lim DJ, Byun SS, Paick JS, Oh SJ. Voiding diary for the evaluation of urinary incontinence and lower urinary tract symptoms: prospective assessment of patient compliance and burden. Neurourology and Urodynamics: Official Journal of the International Continence Society. 2004;23:331-5.

19. Choi YS, Kim JC, Lee KS, Seo JT, Kim HJ, Yoo TK, et al. Analysis of female voiding dysfunction: a prospective, multi-center study. International urology and nephrology. 2013;45:989-94.
20. Hsiao SM, Lin HH, Kuo HC. International Prostate Symptom Score for assessing lower urinary tract dysfunction in women. International urogynecology journal. 2013;24:263-7.
21. Olujide LO, O'Sullivan SM. Female voiding dysfunction. Best practice & research clinical obstetrics &gynecology. 2005;19:807-28.
22. Avery K, Donovan J, Peters TJ, Shaw C, Gotoh M, Abrams P. ICIQ: a brief and robust measure for evaluating the symptoms and impact of urinary incontinence. Neurourology and Urodynamics: Official Journal of the International Continence Society. 2004;23:322-30.
23. Sirls LT, Tennstedt S, Brubaker L, Kim HY, Nygaard I, Rahn DD, et al. The minimum important difference for the International Consultation on Incontinence Questionnaire—Urinary Incontinence Short Form in women with stress urinary incontinence. Neurourology and urodynamics. 2015;34:183-7.
24. Abrams P, Andersson KE, Birder L, Brubaker L, Cardozo L, Chapple C, et al. Fourth International Consultation on Incontinence Recommendations of the International Scientific Committee: Evaluation and treatment of urinary incontinence, pelvic organ prolapse, and fecal incontinence. Neurourology and Urodynamics: Official Journal of the International Continence Society. 2010;29:213-40.
25. Groutz A, Gordon D, Lessing JB, Wolman I, Jaffa A, David MP. Prevalence and characteristics of voiding difficulties in women: are subjective symptoms substantiated by objective urodynamic data?. Urology. 1999;54:268-72.
26. Yamanishi T, Sakakibara R, Uchiyama T, Hirata K. Role of urodynamic studies in the diagnosis and treatment of lower urinary tract symptoms. Urological science. 2011;22:120-8.

27. Robinson D, Cardozo L, Milsom I, Pons ME, Kirby M, Koelbl H, et al. Oestrogens and overactive bladder. Neurourology and urodynamics. 2014;33:1086-91.
28. Koubaa S, Zohra Ben Salah F, Miri I, Ghorbel S, Lebib S. Les neurovessies du diabete. Tunisie médicale. 2009;87:279-82.
29. Changxiao H, Zhengyong Y, Shibing Y, Caiwen W, Yingchuan H, Wei H, et al. Clinical and urodynamic evaluation of women referred with diabetes mellitus. International urogynecology journal. 2014;25:979-83.
30. Lo TS, Chua S, Uy-Patrimonio MC, Kao CC, Lin CH. Clinical outcomes of detrusor underactivity in female with advanced pelvic organ prolapse following vaginal pelvic reconstructive surgery. Neurourology and urodynamics. 2018;37:2242-8.
31. Carlson Kv, Rome S, Nitti Vw. Dysfunctional voiding in women. The Journal of urology. 2001;165:143-8.
32. Zermann DH, Löffler U, Reichelt O, Wunderlich H, Wilhelm S, Schubert J. Bladder dysfunction and end stage renal disease. International urology and nephrology. 2003;35:93-7.
33. Groutz A, Blaivas JG, Chaikin DC. Bladder outlet obstruction in women: definition and characteristics. Neurourology and Urodynamics: Official Journal of the International Continence Society. 2000;19:213-20.
34. Robinson D, Cardozo L. Overactive bladder: diagnosis and management. Maturitas. 2012;71:188-93.
35. Fusco F, Groutz A, Blaivas Jg, Chaikin Dc, Weiss Jp. Videourodynamic studies in men with lower urinary tract symptoms: a comparison of community based versus referral urological practices. The journal of urology. 2001;166:910-3.
36. Sawaqed F, Abughosh Z, Suoub M. The Prevalence of Detrusor Underactivity and its Symptoms Co-relation with Urodynamic Study Findings in Patients with Lower Urinary Tract Symptoms. Research and Reports in Urology. 2020;12:415.
37. McGuire EJ, Lytton BE, Pepe VI, Kohorn EI. Stress urinary incontinence. Obstetrics and gynecology. 1976;47:255-64.

38. Al Mousa RT, Al Dossary N, Hashim H. The role of urodynamics in females with lower urinary tract symptoms. Arab journal of urology. 2019;17:2-9.
39. Madhu C, Swift S, Moloney-Geany S, Drake MJ. How to use the pelvic organ prolapse quantification (POP-Q) system? Neurourology and urodynamics. 2018 ;37:S39-43.
40. Barry MJ, Fowler FJ Jr, O'Leary MP, Bruskewitz RC, Holtgrewe HL, Mebust WK, Cockett The American Urological Association symptom index for benign prostatic hyperplasia. The Measurement Committee of the American Urological Association AT J Urol. 1992;148:1549-57.
41. Grodstein F, Lifford K, Resnick NM. Postmenopausal hormone therapy and risk of developing urinary incontinence. Obstet Gynaecol 2004;103:254–60
42. Grady D, Brown JS, Vittinghoff E. Postmenopausal hormones and incontinence: The heart and estrogen/progestin replacement study. Obstet Gynaecol 2001;97:116–20
43. Chung HY, Chang JS, Kim SH, Song KH, Jang YS, Han DS. The Effects of Estrogen on Detrusor Contraction and the Expression of Muscarinic Receptors in Ovariectomized Rats. Korean Journal of Urology. 2008;49:1105-11.
44. Zhu Q, Ritchie J, Marouf N, Dion Sb, Resnick Nm, Elbadawi A,. Role of ovarian hormones in the pathogenesis of impaired detrusor contractility: evidence in ovariectomized rodents. The Journal of urology. 2001;166:1136-41
45. Kaplan SA, Te AE, Blaivas JG, McGuire EJ. Urodynamic findings in patients with diabetic cystopathy. The Journal of urology. 1995;153:342-4.
46. Andersen LF, Agner T, Walter S, Hansen JM. Micturition pattern in hyperthyroidism and hypothyroidism. Urol. 1987;29:223-4
47. Goldstein I, Siroky MB, Sax DS, Krane RJ. Neurourologic abnormalities in multiple sclerosis. J Urol. 1982;128:541-5
48. Romanzi LJ, Chaikin DC, Blaivas JG. The effect of genital prolapse on voiding. J Urol. 1999;161:581-6

49. Wang KH, Wang KH, Neimark M, Davila GW. Voiding dysfunction following TVT procedure.Int Urogynecol J Pelvic Floor Dysfunct. 2002;13:353-7.
50. Irwin DE, Milsom I, Hunskaar S, Reilly K, Kopp Z, Herschorn S, et al. Population-based survey of urinary incontinence, overactive bladder, and other lower urinary tract symptoms in five countries: results of the EPIC study. Eur Urol. 2006;50:1306-14
51. Schäfer W, Abrams P, Liao L, Mattiasson A, Pesce F, Spangberg A, et al. Good urodynamic practices: uroflowmetry, filling cystometry, and pressure-flow studies. International Continence Society. Neurourol Urodyn. 2002;21:261-74.
52. Defreitas GA, Zimmern PE, Lemack GE, Shariat SF. Refining diagnosis of anatomic female bladder outlet obstruction: comparison of pressure-flow study parameters in clinically obstructed women with those of normal controls. Urology. 2004;64:675-9.
53. Gotoh M, Yoshikawa Y, Ohshima S. Pathophysiology and subjective symptoms in women with impaired bladder emptying. S Int J Urol. 2006;13:1053-7.
54. Wein AJ. Classification of neurogenic voiding dysfunction. The Journal of Urology. 1981;125:605-9.
55. Abrams P. Bladder outlet obstruction index, bladder contractility index and bladder voiding efficiency: three simple indices to define bladder voiding function. BJU Int. 1999;84:14-5.
56. Panicker JN, Fowler CJ, Kessler TM. Lower urinary tract dysfunction in the neurological patient: clinical assessment and management. The Lancet Neurology. 2015;14:720-32.
57. Ueda T, Yoshimura N, Yoshida O. Diabetic cystopathy: relationship to autonomic neuropathy detected by sympathetic skin response. J Urol 1997;157:580–4.
58. Lee PJ, Kuo HC. High incidence of lower urinary tract dysfunction in women with recurrent urinary tract infections. Low Urin Tract Symptoms. 2020;12:33-40

59. Costantini E, Mearini E, Pajoncini C, Biscotto S, Bini V, Porena M. Uroflowmetry in female voiding disturbances. Neurourology and urodynamics. 2003;22:569-73.
60. Grover S, Srivastava A, Lee R, Tewari AK, Te AE. Role of inflammation in bladder function and interstitial cystitis. Therapeutic advances in urology. 2011;3:19-33.
61. Lucas MG, et al. EAU guidelines on assessment and nonsurgical management of urinary incontinence. Eur Urol. 2012;62:1130–42.

PROFORMA

NAME: _____

AGE: _____

ADDRESS: _____

OCCUPATION: _____

MRD: _____

CHIEF COMPLAINT: _____

_____

HISTORY OF PRESENTING ILLNESS: _____

_____

_____

_____

_____

_____

IPSS: _____

PAST HISTORY: _____

_____

PERSONAL HISTORY: _____

_____

GENERAL PHYSICAL EXAMINATION:

PULSE: _____ BP: _____

RESP. RATE: _____ SPO2: _____

PALLOR: _____ ICTERUS: _____ CYANOSIS: _____

CLUBBING: _____ LYMPHADENOPATHY: _____ OEDEMA: _____

SYSTEMIC EXAMINATION:

PER ABDOMEN: _____

_____

_____

_____

_____

EXTERNAL GENETALIA: _____

_____

NERVOUS SYSTEM: _____

_____

CARDIOVASCULAR SYSTEM: _____

MUSCULOSKELETAL SYSTEM: _____

RESPIRATORY SYSTEM: _____

INVESTIGATIONS:

HB		TLC		PLT	
UREA		CREAT			
NA		K		INR	

URINE EXAM:
URINE CULTURE:
USG KUB:
UROFLOMETERY:
URODYNAMICS:

INTERNATIONAL PROSTATE SYMPTOM SCORE SHEET

Dr Name: ..... Address: .....

Patient Name: ..... Address: .....

Date: .....

Age Group: 40-49 ☐ 50-59 ☐ 60-69 ☐ 70+ ☐

	Not at all	Less than 1 time in 5	Less than half the time	About half the time	More than half the time	Almost always	Your score
1. INCOMPLETE EMPTYING Over the past month, how often have you had a sensation of not emptying your bladder completely after you finished urinating?	0	1	2	3	4	5	
2. FREQUENCY Over the past month, how often have you had to urinate again less than two hours after you finished urinating?	0	1	2	3	4	5	
3. INTERMITTENCY Over the past month, how often have you found you stopped and started several times when you urinated?	0	1	2	3	4	5	
4. URGENCY Over the past month, how often have you found it difficult to postpone urination?	0	1	2	3	4	5	
5. WEAK STREAM Over the past month, how often have you had a weak urinary stream?	0	1	2	3	4	5	
6. STRAINING Over the past month, how often have you had to push or strain to begin urination?	0	1	2	3	4	5	
7. NOCTURIA Over the past month, how many times did you most typically get up to urinate from the time you went to bed at night until the time you got up in the morning?	None 0	1 time 1	2 times 2	3 times 3	4 times 4	5 or more times 5	

Which of the above do you regard as most troublesome [1-7] _____

TOTAL PROSTATE SYMPTOM SCORE _____

	Delighted	Pleased	Mostly satisfied	Mixed - satisfied and dissatisfied	Mostly dissatisfied	Unhappy	Terrible
QUALITY OF LIFE DUE TO URINARY SYMPTOMS If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that? (tick one)	0	1	2	3	4	5	6

ICIQ - URINARY INCONTINENCE - SHORT FORM

Subject number | Subject initial

ICIQ-UI Short Form (US English)

CONFIDENTIAL

D D M M M Y Y
Today's date

Many people leak urine some of the time. We are trying to find out how many people leak urine, and how much this bothers them. We would be grateful if you could answer the following questions, thinking about how you have been, on average, over the PAST FOUR WEEKS.

1 **Please write in your date of birth:** DAY MONTH YEAR

2 **Are you** *(check one)*: Female ☐ Male ☐

3 **How often do you leak urine?** *(Check one box)*

never	0
about once a week or less often	1
two or three times a week	2
about once a day	3
several times a day	4
all the time	5

4 **We would like to know how much urine <u>you think</u> leaks.**
How much urine do you <u>usually</u> leak (whether you wear protection or not)?
(Check one box)

none	0
a small amount	2
a moderate amount	4
a large amount	6

5 **Overall, how much does leaking urine interfere with your everyday life?**
Please circle a number between 0 (not at all) and 10 (a great deal)

0 1 2 3 4 5 6 7 8 9 **10**
not at all — a great deal

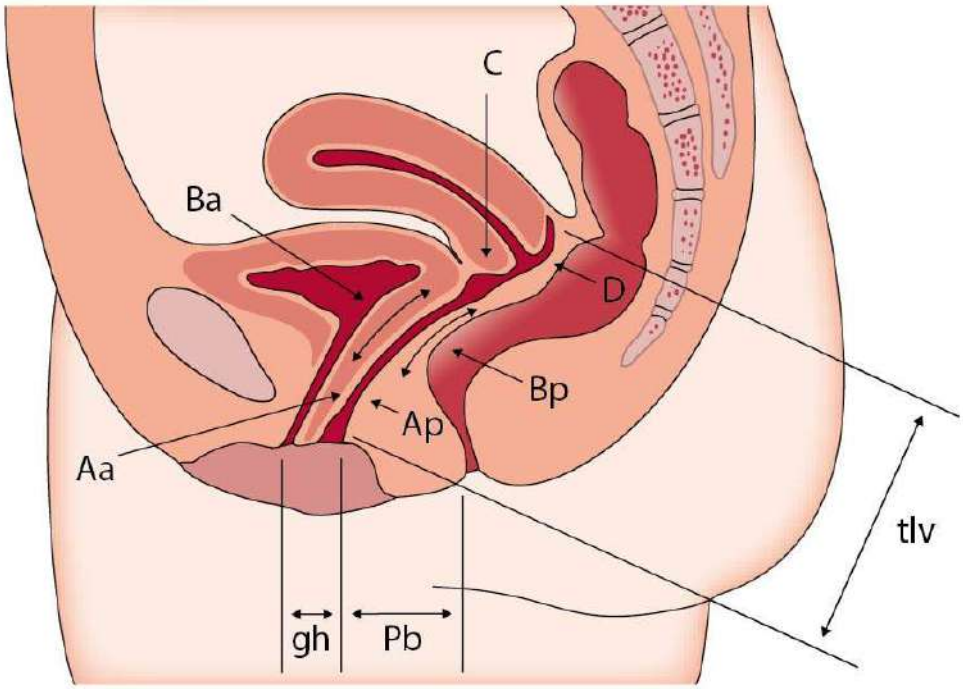
ICIQ score: sum scores 3+4+5 ☐ ☐

6 **When does urine leak?** *(Please check all that apply to you)*

never – urine does not leak	☐
leaks before you can get to the bathroom	☐
leaks when you cough or sneeze	☐
leaks when you are asleep	☐
leaks when you are physically active/exercising	☐
leaks when you have finished urinating and are dressed	☐
leaks for no obvious reason	☐
leaks all the time	☐

Thank you very much for answering these questions.

PELVIC ORGAN PROLAPSE QUANTIFICATION SYSTEM



(Aa) anterior vaginal wall	(Ba) anterior vaginal wall	(C) cervix
(gh) genital hiatus	(Pb) perineum	(tlv) total length vagina
(Ap) posterior vaginal wall	(Bp) posterior vaginal wall	(D) posterior fornix

POP-Q Staging Criteria	
Stage 0	Aa, Ap, Ba, Bp = -3 cm and C or D ≤ – (tvl – 2) cm
Stage I	Stage 0 criteria not met and leading edge < -1 cm
Stage II	Leading edge ≥ -1 cm but ≤ +1 cm
Stage III	Leading edge > +1 cm but < + (tvl – 2) cm
Stage IV	Leading edge ≥ + (tvl – 2) cm

KEY TO MASTER CHART

MRD	Medical Record Dept Number
QOL	Quality of Life
IPSS V	IPSS Voiding Subscore
IPSS S	IPSS Storage Subscore
IPSS V/S	IPSS Voiding/ Storage Score Ratio
IPSS T	International Prostate Symptom Score (Total)
ICIQ UI-SF	ICIQ - Urinary Incontinence - Short Form
MENOP.	Menopausal status
DIABETIC	Diabetic status
NEURO. DISEASE	History of Neurological disease
URO-GYN SURG	History of Uro. / Gynec. Surgery
PREV UTI	History of Recurrent Urinary Tract Infection
POPQ	Pelvic Organ Prolapse Quantification System
USG UB	Urinary Bladder wall on Ultrasonography
USG PVR	Post Void Residual Urine on Ultrasonography
UFM QMAX	Uroflowmetry Peak flow rate
UFM AVG	Uroflowmetry Average flow rate
UDS CAPC	Maximum Bladder capacity on Urodynamic Study
UDS Pdet	Maximum Detrusor pressure on Urodynamic Study
UDS COMPL	Bladder compliance on Urodynamic Study
CPE MEATUS	Urinary meatus on Cystourethroscopy
CPE WALL	Urinary Bladder Wall on Cystourethroscopy
CPE MISC	Miscellaneous findings on Cystourethroscopy
Spine Sx	Spinal Surgery
PIVD	Posterior Intervertebral Disc Prolapse
CVA	Cerebro-Vascular Accident
Hyst.	Hysterectomy
LSCS	Lower Segment Caesarian Section
CAUB	Carcinoma Urinary Bladder / TURBT
Trab	Trabeculation, Bladder Wall (Grade)
Vuj	Vesico Ureteric junction
BCG	Bacille Calmette-Guérin

Sr	MRD	AGE	QOL	IPSS V	IPSS S	IPSS V/S	IPSS T	ICIQ UI-SF	MENOP.	DIABETIC	NEURO. DISEASE	URO-GYN	PREV UTI	POPQ	USG UB	USG PVR	UFM QMA	UFM AVG	UDS CAPC	UDS Pdet	UDC COMP	CPE MEAT	CPE WALL	CPE MISC	DIA GN	DIA GN	DIA GN	DIA GN	DIA GNO
1	966530	21	5	19	1	19.00	20	0	n	n	n	n	n	0	n	200	-	-	700	8	24	-	-	-	-	dua	-	-	-
2	806138	31	6	16	14	1.14	30	0	n	n	n	lscs	y	0	n	10	21	8	-	-	-	n	erythe	ic	-	-	-	cysti	-
3	947721	41	1	4	4	1.00	8	0	n	y	n	n	n	0	n	12	16	10	-	-	-	-	-	-	oab	-	-	-	-
4	745549	43	4	4	4	1.00	8	0	n	n	n	lscs	n	0	n	0	17	7	-	-	-	stenoti	-	-	-	-	boo	-	-
5	880562	42	4	11	3	3.67	14	0	n	n	n	n	y	1	cystitis	225	4	3	468	13	39	-	-	-	oab	-	-	-	-
6	988019	70	3	14	3	4.67	17	0	y	n	scoliosis	n	n	0	trab 1	0	2	0	257	24	48	n	trab 1	-	oab	-	-	-	-
7	680364	61	3	14	3	4.67	17	0	y	y	n	n	y	2	n	428	-	-	532	6	32	n	n	large c	-	dua	-	-	-
8	1032914	71	3	12	10	1.20	22	16	y	n	alzhimers	hyst	y	1	divert	234	-	-	-	-	-	n	trab 3	-	oab	-	-	-	sui
9	75244	37	3	12	3	4.00	15	0	n	n	n	n	y	0	cystitis	34	17	6	-	-	-	-	-	-	oab	-	-	-	-
10	1007482	67	4	14	4	3.50	18	0	y	n	cva	n	y	0	cystitis	221	12	4	632	4	33	-	-	-	-	dua	-	-	-
11	857828	56	3	16	5	3.20	21	0	y	y	n	n	y	1	trab 2	550	-	-	594	4	43	stenoti	tarb 2	-	oab	dua	boo	-	-
12	1047223	52	5	4	11	0.36	15	0	y	n	n	n	y	3	thk	170	13	5	-	-	-	n	n	cystoc	-	-	boo	-	-
13	962891	25	3	8	11	0.73	19	0	n	n	n	y	n	0	n	10	20	15	-	-	-	-	-	-	oab	-	-	-	-
14	1047797	41	4	13	8	1.63	21	14	n	n	n	hyst	y	3	n	86	14	6	-	-	-	stenoti	trab 2	-	-	-	boo	-	sui
15	79299	66	4	6	6	1.00	12	0	y	n	n	n	n	1	n	200	15	7	-	-	-	-	-	-	-	dua	-	-	-
16	1033256	33	5	15	12	1.25	27	18	n	n	pivd	n	y	0	n	214	18	7	-	-	-	n	n	-	-	-	-	-	sui
17	927892	25	2	6	7	0.86	13	0	n	n	n	n	y	0	n	0	26	15	-	-	-	n	n	-	oab	-	-	-	-
18	1081403	56	4	11	9	1.22	20	15	y	n	spine sx	n	y	2	trab 2	350	9	3	480	13	47	n	trab 2	-	-	-	boo	-	sui
19	1090531	20	5	15	2	7.50	17	0	n	n	n	n	n	0	n	438	-	-	580	26	43	n	n	-	-	-	boo	-	-
20	471518	81	3	10	4	2.50	14	15	y	y	n	n	n	3	cystitis	754	-	-	680	3	22	n	n	-	-	dua	-	-	-
21	531664	71	3	16	9	1.78	25	0	y	y	pivd	hyst	y	1	n	38	13	7	-	-	-	-	-	-	oab	-	boo	-	-
22	1088494	80	5	16	9	1.78	25	0	y	y	n	lscs	y	2	n	980	-	-	1020	2	34	n	n	large c	-	dua	-	-	-
23	876509	45	4	16	7	2.29	23	0	n	y	n	lscs	n	0	n	260	8	3	642	26	33	stenoti	trap 1	-	-	-	boo	-	-
24	898374	55	4	12	11	1.09	23	14	y	y	n	hyst	y	1	n	121	14	5	-	-	-	n	trab 1	-	-	-	boo	-	-
25	873191	71	4	7	16	0.44	23	16	y	n	spine sx	n	y	0	n	560	-	-	780	3	31	n	n	-	-	dua	-	-	sui
26	1014742	23	5	13	12	1.08	25	0	n	n	n	vaginopl	y	0	n	120	15	8	-	-	-	stenoti	trab 1	-	-	-	boo	-	-
27	1108213	68	3	9	5	1.80	14	0	y	n	n	labial adh	y	0	trab1	220	4	2	-	-	-	stenoti	trab 1	labial a	-	-	boo	-	-
28	1122276	62	5	3	13	0.23	16	0	y	y	n	n	y	0	n	100	3	2	-	-	-	stenoti	n	-	-	-	boo	-	-
29	1119965	65	4	10	11	0.91	21	0	y	y	pivd	lscs	y	0	cystitis	28	7	3	325	28	48	stenoti	trab 2	-	-	-	boo	-	-
30	1122410	65	5	13	12	1.08	25	0	y	y	n	lscs	n	1	n	10	13	7	-	-	-	-	-	-	oab	-	-	-	-
31	111089	54	3	14	9	1.56	23	0	y	y	n	n	y	0	trab2	nil	14	3	-	-	-	n	trab 1	erythe	-	-	-	cysti	-
32	1115294	41	4	11	11	1.00	22	0	n	n	n	lscs, calib	y	0	cystitis	30	11	4	-	-	-	stenoti	trab 3	trigonr	-	-	boo	-	-
33	1111557	48	4	8	12	0.67	20	0	y	n	n	hyst	y	0	n	57	4	2	-	-	-	stenoti	n	-	-	-	boo	-	-
34	433273	38	3	15	1	15.00	16	0	n	y	n	hyst	y	0	n	123	7	4	525	12	38	n	n	large c	-	dua	-	-	-
35	1158391	65	6	16	13	1.23	29	0	n	y	pivd	n	y	2	cystitis	34	-	-	275	22	43	-	-	-	oab	-	-	-	-
36	70627	32	5	15	10	1.50	25	0	n	n	n	n	n	0	n	12	10	4	-	-	-	stenoti	trab 1	-	-	-	boo	-	-
37	797674	35	5	4	12	0.33	16	17	n	n	n	n	y	2	n	20	20	12	-	-	-	n	trab 2	cystole	-	-	boo	-	sui
38	1189327	78	5	15	7	2.14	22	0	y	y	pivd	n	y	1	n	189	12	7	-	-	-	n	n	-	-	dua	-	-	-
39	3398	57	4	12	11	1.09	23	0	y	n	n	hyst	n	0	n	21	12	4	-	-	-	n	trab 2	-	oab	-	-	-	-
40	1143113	34	5	4	12	0.33	16	0	n	n	n	n	n	0	n	0	15	8	-	-	-	carunc	trab 1	-	-	-	boo	-	-
41	110363	69	4	5	7	0.71	12	0	y	n	n	n	n	1	n	50	13	8	-	-	-	-	-	-	oab	-	-	-	-
42	26973	78	4	5	6	0.83	11	16	y	n	n	n	n	0	echos	80	18	7	-	-	-	n	erythe	-	oab	-	-	-	-
43	1083805	71	4	3	11	0.27	14	18	y	n	n	lscs	y	1	cystitis	25	23	14	-	-	-	n	erythe	-	-	-	-	cysti	sui
44	1182246	35	5	15	8	1.88	23	0	n	n	pivd	n	y	0	n	100	4	2	432	18	44	stenoti	n	-	oab	-	boo	-	-
45	1134872	38	3	8	8	1.00	16	0	n	n	n	n	n	0	vuj cal	10	23	7	-	-	-	n	n	vuj oec	-	-	-	cysti	-
46	1042481	35	4	7	10	0.70	17	0	n	n	n	n	n	0	cystitis	10	12	5	-	-	-	stenoti	trab 2	-	-	-	boo	-	-
47	1183720	47	3	3	10	0.30	13	16	y	n	spine sx	lscs	n	2	n	23	25	11	358	12	34	-	-	-	oab	-	-	-	sui
48	1156789	48	4	12	10	1.20	22	0	n	n	n	lscs	y	0	trab 1	50	5	3	-	-	-	stenoti	trab 2	-	-	-	boo	-	-
49	555417	83	5	18	9	2.00	27	0	y	y	n	hyst	y	2	trab 3	20	5	2	-	-	-	stenoti	trab 3	-	-	-	boo	-	-
50	1201366	78	3	9	8	1.13	17	12	y	y	n	hyst	n	1	n	50	18	8	-	-	-	carunc	n	-	-	-	boo	-	-

Sr	MRD	AGE	QOL	IPSS V	IPSS S	IPSS V/S	IPSS T	ICIQ UI-SF	MENOP.	DIABETIC	NEURO. DISEASE	URO-GYN	PREV UTI	POPQ	USG UB	USG PVR	UFM QMA	UFM AVG	UDS CAPC	UDS Pdet	UDC COMP	CPE MEAT	CPE WALL	CPE MISC	DIA GN	DIA GN	DIA GN	DIA GN	DIA GNO
51	1128025	67	4	4	6	0.67	10	12	y	n	n	n	y	1	cystitis	80	18	8	-	-	-	n	n	cystoc	-	-	boo	-	-
52	1125785	70	5	11	10	1.10	21	0	y	n	n	cpe	y	0	n	200	4	2	234	10	38	stenoti	trab 2	-	-	-	boo	-	-
53	1134885	56	4	14	8	1.75	22	0	y	y	n	hyst	y	0	echos	32	6	3	468	11	31	n	n	-	-	dua	-	-	-
54	1062645	75	5	13	12	1.08	25	0	y	y	n	caub	y	0	cystitis	100	16	6	-	-	-	n	cystitis	bcg cys	-	-	-	cysti	-
55	605048	46	3	5	9	0.56	14	0	n	y	n	lscs/turbl	n	0	n	0	13	6	-	-	-	n	scar	erythe	-	-	-	cysti	-
56	1052993	36	5	11	8	1.38	19	0	n	n	n	n	y	0	echos	0	12	6	-	-	-	carunc	n	-	-	-	boo	-	-
57	1070153	40	4	10	9	1.11	19	0	n	n	n	n	y	0	cystitis	40	6	3	-	-	-	stenoti	n	-	-	-	boo	-	-
58	1201333	55	5	13	9	1.44	22	15	y	n	cva	lscs	y	n	n	0	14	7	-	-	-	urethri	n	-	-	-	-	-	sui
59	566918	64	5	13	9	1.44	22	0	y	y	n	n	y	0	n	800	-	-	800	4	14	stenoti	trab 2	-	-	dua	boo	-	-
60	198029	70	4	15	4	3.75	19	0	y	y	n	n	n	0	n	550	-	-	562	16	35	-	-	-	-	dua	-	-	-
61	1014818	70	5	9	10	0.90	19	0	y	n	n	caub	n	0	n	20	13	4	-	-	-	n	trigoni	-	-	-	-	cysti	-
62	1185838	49	5	14	9	1.56	23	0	y	n	pivd	n	n	0	n	300	3	1	600	4	16	stenoti	-	-	-	dua	boo	-	-
63	1176315	48	5	6	11	0.55	17	0	n	n	n	hyst	y	0	n	0	16	8	-	-	-	n	erythe	radiati	-	-	-	cysti	-
64	1156040	55	4	11	11	1.00	22	0	y	n	n	lscs	y	0	cystitis	60	13	8	-	-	-	n	cystitis	chroni	-	-	-	cysti	-
65	114557	48	5	14	9	1.56	23	0	n	n	n	n	n	0	trab 1	80	8	3	-	-	-	stenoti	trab 2	-	-	-	boo	-	-
66	418057	41	3	5	11	0.45	16	0	n	n	n	n	y	0	cystitis	0	23	10	-	-	-	trigoni	-	-	-	-	-	cysti	sui
67	1203822	47	5	5	9	0.56	14	15	y	n	n	n	n	1	n	60	16	8	-	-	-	n	trigoni	-	-	-	-	-	sui
68	1219913	70	5	13	7	1.86	20	0	y	y	n	n	y	0	trab 3	100	12	6	-	-	-	stenoti	trab 4	diverti	-	-	boo	-	-
69	1161502	70	5	10	13	0.77	23	0	y	y	n	hyst	y	0	n	30	8	3	200	15	44	n	trigoni	n	oab	-	boo	-	-
70	59775	70	5	16	7	2.29	23	0	y	n	n	n	n	2	n	100	12	4	-	-	-	n	n	-	-	dua	-	-	-
71	1223572	70	5	16	8	2.00	24	0	y	y	n	lscs/hyst	y	2	n	180	11	4	745	13	29	-	-	-	-	dua	-	-	-
72	1231459	37	3	11	7	1.57	18	0	n	y	n	n	y	0	n	400	-	-	408	8	34	-	-	-	-	dua	-	-	-
73	1225642	79	5	9	11	0.82	20	18	y	n	n	forceps	n	2	n	10	18	6	-	-	-	mucos	trab 1	-	-	-	boo	-	sui
74	663843	44	5	10	7	1.43	17	0	n	n	n	cpe	n	0	n	0	8	4	-	-	-	stenoti	n	-	-	-	boo	-	-
75	1226628	60	6	17	12	1.42	29	0	y	n	n	hyst	y	2	cystitis	200	1	1	-	-	-	stenoti	trab 2	labial a	-	-	boo	-	-
76	941729	41	3	8	4	2.00	12	0	n	y	n	n	n	0	n	14	16	10	-	-	-	-	-	-	oab	-	-	-	-
77	910048	71	5	12	10	1.20	22	17	y	n	alzhimers	hyst	y	1	divert	231	8	3	732	11	35	n	n	-	-	dua	-	-	-
78	1034120	25	3	10	14	0.71	24	0	n	n	n	y	n	0	n	12	20	15	-	-	-	-	-	-	oab	-	-	-	-
79	1153773	25	2	7	13	0.54	20	0	n	n	n	n	y	0	n	0	26	15	-	-	-	n	n	-	oab	-	-	-	-
80	1156666	71	3	9	13	0.69	22	0	y	y	pivd	hyst	y	1	n	0	13	7	-	-	-	stenoti	trab 2	-	oab	-	boo	-	-
81	1174800	71	4	9	14	0.64	23	0	y	n	n	n	y	0	n	187	18	8	-	-	-	-	n	-	oab	-	-	-	-
82	1100585	65	4	10	11	0.91	21	0	y	y	pivd	lscs	y	0	cystitis	28	7	3	421	28	48	stenoti	trab 2	-	-	-	boo	-	-
83	1134289	38	3	10	3	3.33	13	0	n	y	n	hyst	y	0	n	128	7	4	525	12	38	n	n	large c	-	dua	-	-	-
84	1185634	78	5	15	7	2.14	22	0	y	y	pivd	n	y	1	n	189	12	7	-	-	-	n	n	-	-	dua	-	-	-
85	110363	69	4	6	7	0.86	13	0	y	n	n	n	n	1	n	60	13	8	-	-	-	-	-	-	oab	-	-	-	-
86	537663	38	3	8	8	1.00	16	0	n	n	n	hyst	n	0	vuj ede	10	23	7	-	-	-	n	n	-	-	-	-	cysti	-
87	598798	83	5	18	10	1.80	28	0	y	y	n	n	y	2	trab 3	20	5	2	-	-	-	stenoti	trab 3	-	-	-	boo	-	-
88	1134289	67	4	4	6	0.67	10	12	y	n	n	n	y	1	cystitis	122	18	8	-	-	-	-	-	-	-	-	boo	-	sui
89	1224257	70	5	11	10	1.10	21	0	y	n	n	cpe	y	0	n	234	4	2	234	10	38	stenoti	trab 2	-	-	-	boo	-	-
90	989333	55	5	13	10	1.30	23	13	y	n	alzhimers	lscs	y	n	n	0	14	7	-	-	-	urethri	n	-	-	-	-	-	sui
91	88804	49	5	12	9	1.33	21	0	y	n	pivd	n	n	0	n	325	3	1	654	4	17	stenoti	-	-	-	-	dua	boo	-	-
92	956009	47	5	5	7	0.71	12	15	y	n	n	n	n	1	n	60	16	8	-	-	-	n	trigoni	-	-	-	-	-	sui
93	204729	70	5	16	8	2.00	24	0	y	n	n	n	n	2	n	100	12	4	-	-	-	n	n	-	-	dua	-	-	-
94	155503	70	5	16	9	1.78	25	0	y	y	n	lscs/hyst	y	2	n	180	11	4	745	13	29	-	-	-	-	dua	-	-	-
95	1226390	33	5	15	12	1.25	27	19	n	n	pivd	n	y	0	n	214	18	7	-	-	-	n	n	-	-	-	-	-	sui
96	959660	56	4	11	9	1.22	20	15	y	n	pivd	n	y	2	trab 2	350	9	3	480	13	47	n	trab 2	-	-	-	boo	-	sui
97	944335	62	5	3	13	0.23	16	0	y	y	n	n	y	0	n	100	3	2	-	-	-	stenoti	n	-	-	-	boo	-	-
98	876541	32	5	15	10	1.50	25	0	n	n	n	cpe	n	2	n	100	10	4	-	-	-	n	trab 1	-	-	-	boo	-	-
99	935904	48	4	14	10	1.40	24	0	n	n	n	lscs	y	0	trab 1	50	5	3	-	-	-	stenoti	trab 2	-	-	-	boo	-	-
######	1237570	70	5	10	13	0.77	23	0	y	y	n	hyst	y	0	n	30	8	3	200	15	44	n	trigoni	n	oab	-	boo	-	-

EXAMINER 17. Professor

Baba Farid University
of Health Sciences
Sadiq Road
Faridkot-151 203 (Pb). INDIA.
Phone : 01639-256232,256236
Tele/Fax : 01639-256235
Email – Examination@bfuhs.ac.in

No. BFUHS/2K21p-TH/ 11457 Date 8/9/2021

The Principal,
DMC, Ludhiana

Subject: Approval of Plan of Thesis.

This is to inform you that the Faculty of Medical Sciences in its meeting held on 22.01.2021 has approved the plan of thesis of Dr Azhar Anwar, a student of your college for MCh Urology along with the names of Supervisor/Co-Supervisor as under:-

Topic Plan of Thesis
Evaluation of voiding dysfunction in women: a prospective study

Supervisor
Dr. Sandeep Sharma
Prof. & Head,
Dept. of Urology,
DMCH, Ludhiana.

Co-Supervisor
Dr. Harmandeep Singh Chahal
Assoc. Prof.,
Dept. of Urology,
DMCH, Ludhiana.

The student has to submit the three copies of thesis (along with PDF format) , to the Controller of Examinations, BFUHS, Faridkot, at least six months before the commencement of theory examination, if he/she is otherwise eligible to take the examination. He /She must directed to attach a photocopy of this letter with the forwarding letter while submitting thesis to the University along with the letter of approval of University for change of supervisor/Co-Supervisor, change of topic,(if any).

Dr. S P Singh MS(Oph)
Controller of Examinations

Note :
16. *If any discrepancy found regarding topic of thesis or Supervisor/Co-Supervisor, Inform undersigned within one month after issue of this letter.*

EVALUATION OF VOIDING DYSFUNCTION IN WOMEN: A PROSPECTIVE STUDY

THESIS PROPOSAL

FOR APPROVAL OF SUBJECT OF THESIS TO BE SUBMITTED

IN PARTIAL FULFILMENT OF THE REQUIREMENTS

FOR THE DEGREE OF

MCh

IN

UROLOGY

OF THE

BABA FARID UNIVERSITY OF HEALTH SCIENCES

FARIDKOT

MARCH, 2020

DR. AZHAR ANWAR

DEPARTMENT OF UROLOGY

DAYANAND MEDICAL COLLEGE & HOSPITAL

LUDHIANA

ABSTRACT OF PLAN OF THESIS

Title	Evaluation of voiding dysfunction in women: A prospective study
For the degree of	MCh Urology
Name of the candidate	Dr. Azhar Anwar
Supervisor	Dr. Sandeep Sharma, Professor & Head, Department of Urology, DMCH, Ludhiana.
Co-supervisor	Dr. Harmandeep Singh Chahal, Associate Professor, Department of Urology, DMCH, Ludhiana.
Institution	Dayanand Medical College & Hospital, Ludhiana
University	Baba Farid University of Health Sciences, Faridkot

Introduction: Female voiding dysfunction has not been studied actively. The prevalence of voiding dysfunction (VD) in women varies between 2% and 65% and appears to increase with age. It is a major cause of bother and reason for poor quality of life scores.

Aim of Study: 1. To identify the causes of voiding dysfunction in women above 18 years of age. 2. To correlate the factors associated with voiding dysfunction.

Materials & Methods: Women with the complaint of abnormal urination, admitted or visiting, Department of Urology and other concerned departments, at Dayanand Medical College and Hospital.

Clinical Significance: Urologists often encounter women complaining of voiding difficulties without any evident urinary tract infection, but they are often overlooked due to the lack of definitions, diagnostic criteria, and treatment guidelines. This study intends to identify the causes and thus help treat voiding dysfunction in women. Consequentially it would also help improve quality of life scores and avoid end stage renal disease in these patients.

Keywords: Voiding Dysfunction, Urology, Urogynaecology, QoL.

(Signature)	(Signature)	(Signature)	(Signature)
Candidate	Co-supervisor	Supervisor	Principal

CERTIFICATE OF FACILITIES AVAILABLE

This is to certify that the facilities for work on the subject of thesis titled **"EVALUATION OF VOIDING DYSFUNCTION IN WOMEN: A PROSPECTIVE STUDY"** exist in the Department of Urology, DMC&H, Ludhiana and will be provided to the candidate. We will see that the data being included in the thesis is genuine and is collected by the candidate himself under our supervision and guidance.

Supervisor

Dr. Sandeep Sharma
Professor & Head
Department of Urology
DMCH, Ludhiana

Co-Supervisor

Dr. Harmandeep Singh Chahal
Associate Professor
Department of Urology
DMCH, Ludhiana

Head of the Department

Dr. Sandeep Sharma
Professor & Head
Department of Urology
DMCH, Ludhiana

Place : Ludhiana

Date : 21.05.2020

APPROVAL PROFORMA
BY RESEARCH & ETHICAL COMMITTEE
DAYANAND MEDICAL COLLEGE & HOSPITAL, LUDHIANA

Name of candidate	Dr. Azhar Anwar
Department	MCh Urology
Topic of Thesis	EVALUATION OF VOIDING DYSFUNCTION IN WOMEN: A PROSPECTIVE STUDY
Likely date of appearing in PG examination	MAY, 2022
Date of enrollment	11th September, 2019
Name of Head of Department	Dr. Sandeep Sharma
1) Supervisor	Dr. Sandeep Sharma
2) Co-Supervisor(s)	Dr. Harmandeep Singh Chahal
Signature of Members of Research Committee with Stamp	**Signature of Members of Ethics Committee with Stamp**
Dr. Jaspal Singh (Professor & Head, Surgery)	Mr. A K Jindal (Member, Ethics Committee)
Dr. Dinesh Gupta (Professor & Head, Medicine)	Dr. Anu Sharma (Professor, Anatomy)
Dr. Sandeep Kaushal (Assistant Dean Academics)	Dr. Deepinder K Chhina (Professor & Head, Microbiology)
Dr. Rajoo Singh Chhina (Dean Academics)	Dr. Neena Sood (Professor & Head, Pathology)
Dr. Gurpreet S Wander (Vice Principal)	Dr. Gurpreet S Wander (Vice Principal)
	Dr. Gagandeep Singh (Secretary, Ethics Committee Professor & Head, Neurology)

Approved: Yes / ~~No~~

Dr. Sandeep Puri
Chairperson
Research Committee

Chairperson
Research Committee

Approved: Yes / ~~No~~

Prof. Arvind Malhotra
Chairperson
Ethics Committee

Chairperson
Ethics Committee

BABA FARID UNIVERSITY OF HEALTH SCIENCES, FARIDKOT

PROFORMA FOR REGISTRATION OF SUBJECT FOR DISSERTATION

1	NAME OF THE CANDIDATE AND ADDRESS	Dr. Azhar Anwar N-13/3 Sarai Surjan, Teleyana Crossing, Bajardiha, Varanasi 221005. U.P.
2	NAME OF THE INSTITUTE	DAYANAND MEDICAL COLLEGE AND HOSPITAL LUDHIANA
3	COURSE OF STUDY AND SUBJECT	MCh UROLOGY
4	DATE OF ADMISSION OF COURSE	11th September, 2019
5	TITLE OF THE TOPIC	EVALUATION OF VOIDING DYSFUNCTION IN WOMEN: A PROSPECTIVE STUDY

6. BRIEF RESUME OF THE INTENDED WORK

6.1 NEED FOR THE STUDY

Lower urinary tract symptoms (LUTS) have been traditionally associated with the prostate in men and overactive bladder (OAB) in women. Only recently has male OAB become a subject of interest and studies. However, Female voiding dysfunction has not been studied as actively.

The International Continence Society (ICS) states that: 'Normal voiding is achieved by a voluntarily initiated continuous detrusor contraction that leads to complete bladder emptying within a normal time span and in the absence of obstruction'.[1]

Urologists often encounter women complaining of voiding difficulties without any evident urinary tract infection, but they are often overlooked due to the lack of definitions, diagnostic criteria, and treatment guidelines.

The prevalence of voiding dysfunction (VD) in women varies between 2% and 65% and appears to increase with age.[2]

A broad range of definitions of VD in women have been suggested. 'Voiding dysfunction' is a diagnosis of symptoms and urodynamic investigations, and is defined by ICS/IUGA as abnormally slow and/or incomplete micturition. Abnormal slow urine flow rates and abnormally high post void residuals form the basis of this diagnosis.[3]

VD can predispose to acute or chronic urinary retention. In acute retention, the patient is unable to pass urine and has a palpable or persuasible bladder.[1] Chronic retention has a more insidious presentation with patients typically complaining of frequency, poor stream, overflow incontinence, or recurrent urinary tract infections (UTI). These can, in turn, lead to decompensation of proximal urinary tract, vesicoureteral reflux and injury to renal parenchyma.

Zermann DH et al. observed that there is a high incidence of bladder dysfunction of different degrees in patients with renal failure. A urodynamic assessment before renal transplantation is recommended in all patients reporting symptoms of dysfunctional voiding and/or

bladder storage problems in order to avoid allograft dysfunction due to chronic bladder dysfunction and related complications.[4]

Voiding dysfunction also is a major cause of bother and reason for poor quality of life scores. And improvements of voiding and storage symptoms correlate with improvements of QoL.[5]

This study intends to identify the causes and thus help treat voiding dysfunction in women. Consequentially it would help improve quality of life scores and avoid end stage renal disease in these patients.

6.2 REVIEW OF LITERATURE

Stanton SL defines Voiding dysfunction (VD), a diagnosis by symptoms and urodynamic investigations, as abnormally slow and/or incomplete micturition.[6]

Abnormal slow urine flow rates and abnormally high post void residuals, form the basis of this diagnosis. This diagnosis should be based on a repeated measurement to confirm the abnormality.

Depending on definition, voiding dysfunction has a prevalence of 4% [7] to 39% [8], the latter figure making it either the third or fourth most common urodynamic diagnosis (after urodynamic stress incontinence, pelvic organ prolapse, and possibly detrusor over activity).

Diagnosis and treatment of female voiding dysfunction are based on a thorough history and examination along with appropriate investigations. Treatment should be individualized and always starts with non-invasive and conservative options followed by introduction of pharmacotherapy and lastly surgery. There is need for more research in defining female voiding dysfunction and a standardized classification. This can bring more consistency in treatment and follow up.[9]

Female VD might be related to detrusor under activity or/and bladder outlet obstruction. Voiding and storage symptoms can coexist, making the diagnosis challenging, with the need for a targeted clinical investigation, and further evaluation by imaging and urodynamics.[10]

Lower Urinary Tract Symptoms (LUTS) can be grouped as Storage, Voiding and Post micturition symptoms.

Storage symptoms include increased daytime frequency, Nocturia, Urgency, Urinary incontinence (Stress urinary incontinence, Urge urinary incontinence or Mixed urinary incontinence), Enuresis, Nocturnal enuresis and Continuous urinary incontinence.

Voiding symptoms are Slow stream, Intermittent stream, Splitting or spraying, Hesitancy, straining to void and Terminal dribble. Postmicturition symptoms include Feeling of incomplete emptying and Postmicturition dribble.[2]

Doumouchtsis broadly grouped the causes of Voiding Dysfunction into the following groups: post-surgical, bladder over distention,

inflammatory, outflow obstruction, neurogenic, pharmacological, medical and psychogenic.[11]

Hsiao et al[12] investigated the feasibility of using the IPSS (International Prostate Symptom Score) and IPSS-V/S (Voiding/ Storage Ratio) to evaluate female LUTS. The IPSS-V/S may provide an initial guide for the treatment of VD in women.

Symptoms are poorly specific for diagnosis of voiding dysfunction, which will often require identification of both clinical and urodynamic features. Uroflowmetry, an easy test to perform, should be considered the first step toward diagnosis.[13]

Voiding dysfunction' (VD) a diagnosis by symptoms and urodynamic investigations is defined by ICS/IUGA as abnormally slow and/or incomplete micturition. Abnormal slow urine flow rates and abnormally high post void urine needs to be considered in conjunction with bladder capacity, patient's symptoms and renal function

Stanton et al., defined these measures as peak flow rates of < 15 ml/second and/or 200 ml or more of residual urine.[14]

LUTS in female patients is a very common condition that may carry a serious negative impact on the social, financial, physical, and psychological well-being of patients and their families. The role of UDS continues to be a heavily debated subject for assessing female patients with LUTS. Nonetheless, UDS remains a valuable diagnostic test that provides vital information with minimal morbidity.[15]

6.3 AIMS AND OBJECTIVES OF THE STUDY

- To identify the causes of voiding dysfunction in women above 18 years of age.
- To correlate the factors associated with voiding dysfunction.

7.0 MATERIALS AND METHODS

Women with lower urinary tract symptoms and IPSS score of more than 7, will be selected for the study. An informed consent would be taken. A thorough history and physical examination would be conducted.

Emphasis would be given to lower urinary tract symptoms. IPSS score, voiding and storage sub scores and v/s ratio will be calculated. A detailed history of urological, gynecological or neurological interventions would be taken.

Examination would include a complete general physical assessment and systemic examination. Focus would be on anatomical abnormalities external genitalia, any features of pelvic organ prolapse, abdominal and neurological examination.

Urine routine and microscopic examination will be done and urine for culture and sensitivity sent for all patients. Those testing positive for urinary tract infection will be counselled regarding need for treatment before further assessment can be done.

Renal function tests, ultrasound of the kidneys, ureter and urinary bladder with measurement of post void residue will be done to look for upper tract (kidney and ureter) involvement.

Uroflowmetry will be done for patients without any obvious cause of voiding disturbance from above assessment. Patients with Qmax < 15ml/sec on uroflowmetry will be considered for urodynamics study.

Based on above history, examination and investigations, a diagnosis towards the cause of voiding dysfunction will be made. Prevalence of various causes and its association in terms of V/S ratio, age distribution parity, urinary tract infection, previous urological / gynaecological surgery and genital prolapse will be calculated.

7.1 SOURCE OF DATA:

Women with the complaint of abnormal urination, admitted or visiting, Department of Urology and other concerned departments, at Dayanand Medical College and Hospital, Ludhiana.

7.2 METHOD OF COLLECTION OF DATA

Inclusion Criteria

- Women above 18 years of age
- Abnormal urination for more than one month

Exclusion criteria

- Bed bound patients
- Individuals not consenting to participate in the study

Duration of Study/ Number of Cases: 100 cases.

OUTCOME: Primary outcome: To identify the causes of voiding dysfunction in women above 18 years of age and their prevalence.

Secondary Outcome: To correlate the factors associated with voiding dysfunction.

STATISTICAL ANALYSIS:

Data will be described in terms of range; mean ±standard deviation (± SD), median, frequencies (number of cases) and relative frequencies (percentages) as appropriate. All statistical calculations will be done using SPSS (Statistical Package for the Social Science) SPSS 21 version statistical program for Microsoft Windows.

7.3 DOES THE STUDY REQUIRE ANY INVESTIGATIONS OR INTERVENTIONS TO BE CONDUCTED ON PATIENTS OR OTHER HUMANS OR ANIMALS? IF SO, PLEASE DESCRIBE BRIEFLY.

Urine routine and microscopy

Urine culture

Renal function tests

Ultrasonography with post void residue

Uroflometry

Urodynamic profile (as needed)

The need for individual investigation and their clinical significance has been described above.

7.4 HAS ETHICAL CLEARANCE BEEN OBTAINED FROM YOUR INSTITUTION IN CASE OF 7.3?

Attached herewith

8.0 LIST OF REFERENCES

1. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, et al. The standardization of terminology of lower urinary tract function: Report from the Standardization Subcommittee of the International Continence Society. Neurourol Urodyn. 2002;21:167-78.
2. Irwin DE, Milsom I, Hunskaar S, Reilly K, Kopp Z, Herschorn S, et al. Population-based survey of urinary incontinence, overactive bladder, and other lower urinary tract symptoms in five countries: results of the EPIC study. European urology. 2006;50:1306-15.
3. Haylen BT, de Ridder D, Freeman RM, Swift SE, Berghmans B, Lee J, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. Int Urogynecol J. 2010;21:5-26.
4. Zermann DH, Löffler U, Reichelt O, Wunderlich H, Wilhelm S, Schubert J. Bladder dysfunction and end stage renal disease. Int Urol Nephrol. 2003;35:93-7.
5. Sountoulides P, van Dijk MM, Wijkstra H, de la Rosette JJ, Michel MC. Role of voiding and storage symptoms for the quality of life before and after treatment in men with voiding dysfunction. World journal of urology. 2010;28:3-8.
6. Morrison JFB, Torrens MJ. Neurophysiology. In: Clinical urogynaecology. Stanton SL, Monga AK, editors. London: Churchill Livingstone; 2000. p 17-35.
7. Massey JA, Abrams PH. Obstructed voiding in the female. Br J Urol. 1988;61:36-9.
8. Haylen BT, Krishnan S, Schulz S, Verity L, Law M, Zhou J, et al. Has the true prevalence of voiding difficulty in urogynecology patients been underestimated?. International Urogynecology Journal. 2007;18:53-6.
9. Nikpoor P, Karmakar D, Dwyer P. Female Voiding Dysfunction: a Practical Approach to Diagnosis and Treatment. Current Obstetrics and Gynecology Reports. 2018;7:74-83.

10. Abdel Raheem A, Madersbacher H. Voiding dysfunction in women: How to manage it correctly. Arab J Urol. 2013;11:319-30.
11. Doumouchtsis SK, Jeffery S, Fynes M. Female voiding dysfunction. Obstetrical & gynecological survey. 2008;63:519-26.
12. Hsiao SM, Lin HH, Kuo HC. International prostate symptom score for assessing lower urinary tract dysfunction in women. Int Urogynecol J. 2013;24:263e7.
13. Costantini E, Mearini E, Pajoncini C, Biscotto S, Bini V, Porena M. Uroflowmetry in female voiding disturbances. Neurourol Urodyn. 2003;22:569-73.
14. Stanton SL, Ozsoy C, Hilton P. Voiding difficulties in the female: Prevalence, clinical and urodynamic review. Obstet Gynecol. 1983;61:144-7.
15. Al Mousa RT, Al Dossary N, Hashim H. The role of urodynamics in females with lower urinary tract symptoms. Arab journal of urology. 2019;17:2-9.

PROFORMA

Sr. No_____

NAME: _____

AGE: _____

ADDRESS: _____

OCCUPATION: _____

MRD: _____

CHIEF COMPLAINT:

_____

_____

_____

HISTORY OF PRESENTING ILLNESS: -

_____

_____

_____

_____

_____

_____

_____

IPSS:

_____

PAST HISTORY: _____

_____

_____

Signature of Candidate **Signature of Supervisor**

PERSONAL HISTORY:_____

_____

GENERAL PHYSICAL EXAMINATION:

PULSE: _____ BP: _____

RESP. RATE: _____SPO2:_____

PALLOR: _____ ICTERUS: _____ CYANOSIS: _____

CLUBBING: _____ LYMPHADENOPATHY:_____ OEDEMA: _____

SYSTEMIC EXAMINATION:

PER ABDOMEN:

_____

_____

_____

_____

_____

EXTERNAL GENETALIA: -

_____

_____

NERVOUS SYSTEM:

_____

_____

Signature of Candidate **Signature of Supervisor**

CARDIOVASCULAR SYSTEM:

MUSCULOSKELETAL SYSTEM:

RESPIRATORY SYSTEM:

INVESTIGATIONS:

HB		TLC		PLT	
UREA		CREAT			
NA		K		INR	

URINE EXAM :
URINE CULTURE :
USG KUB :
UROFLOMETERY :
URODYNAMICS :

Signature of Candidate **Signature of Supervisor**

INTERNATIONAL PROSTATE SYMPTOM SCORE SHEET

Dr Name: ..... Address: .....

Patient Name: ..... Address: .....

Date: .....

Age Group: 40-49 ☐ 50-59 ☐ 60-69 ☐ 70+ ☐

	Not at all	Less than 1 time in 5	Less than half the time	About half the time	More than half the time	Almost always	Your score
1. INCOMPLETE EMPTYING Over the past month, how often have you had a sensation of not emptying your bladder completely after you finished urinating?	0	1	2	3	4	5	
2. FREQUENCY Over the past month, how often have you had to urinate again less than two hours after you finished urinating?	0	1	2	3	4	5	
3. INTERMITTENCY Over the past month, how often have you found you stopped and started several times when you urinated?	0	1	2	3	4	5	
4. URGENCY Over the past month, how often have you found it difficult to postpone urination?	0	1	2	3	4	5	
5. WEAK STREAM Over the past month, how often have you had a weak urinary stream?	0	1	2	3	4	5	
6. STRAINING Over the past month, how often have you had to push or strain to begin urination?	0	1	2	3	4	5	
7. NOCTURIA Over the past month, how many times did you most typically get up to urinate from the time you went to bed at night until the time you got up in the morning?	None 0	1 time 1	2 times 2	3 times 3	4 times 4	5 or more times 5	

Which of the above do you regard as most troublesome (1-7) _____

TOTAL PROSTATE SYMPTOM SCORE _____

	Delighted	Pleased	Mostly satisfied	Mixed - satisfied and dissatisfied	Mostly dissatisfied	Unhappy	Terrible
QUALITY OF LIFE DUE TO URINARY SYMPTOMS If you were to spend the rest of your life with your urinary condition just the way it is now, how would you feel about that? (tick one)	0	1	2	3	4	5	6

Signature of Candidate **Signature of Supervisor**

INFORMED PATIENT CONSENT

Date: _____

I.....D/o, W/o, S/o..... am willing to participate in the study **"EVALUATION OF VOIDING DYSFUNCTION IN WOMEN: A PROSPECTIVE STUDY"** The procedure with its complications has been explained to me in local vernacular language. I have fully understood that no special tests and extra expenditure in any form, merely for the purpose of thesis is being carried out. I am free to opt out the study any time without assigning any reason.

.....
Signature of the Witness

.....
Signature of the patient

Name:

Signature of Candidate

Signature of Supervisor

मरीज अनुमति फार्म

तिथि _____

मैं _____ पत्नी/पुत्र/पुत्री _____

निवासी _____

इस शोधकार्य **"EVALUATION OF VOIDING DYSFUNCTION IN WOMEN: A PROSPECTIVE STUDY"** में भाग लेने के लिए सहमत हूँ। मैं इस शोधकार्य में भाग लेने के लिए अपनी स्वेच्छा से तैयार हूँ। मैं पुष्टि करता/करती हूँ की यह स्वीकृति देने के लिए मुझे कोई आर्थिक प्रलोभन नहीं दिया गया और न ही दबाव डाला गया है। मुझे इस शोधकार्य का उद्देश्य स्पष्ट कर दिया गया है और मुझे यह विश्वास है की यह विज्ञान और मानवता के लाभ के लिए है। मुझे इस शोधकार्य में होने वाले जोखिम के बारे में समझा दिया गया है और मेरी समझ में यह जोखिम बहुत मामुली है।

मैं इस शोधकार्य में भाग लेने के सम्बन्ध में किसी भी समय अपनी अस्वीकृति व्यक्त कर सकता/सकती हूँ और मेरे अस्वीकृति व्यक्त करने का मेरे इलाज पर कोई प्रभाव नहीं पड़ेगा।

_____ _____

गवाह के हस्ताक्षर रोगी के हस्ताक्षर/अंगूठे का निशान

नाम: नाम:

_____

अन्वेषक के हस्ताक्षर

_____

विद्यार्थी के हस्ताक्षर

ਮਰੀਜ਼ ਰਜ਼ਾਮੰਦੀ ਫ਼ਾਰਮ

ਮਿਤੀ_____

ਮੈ_____ਪਤਨੀ/ਪੁੱਤਰ/ਪੁੱਤਰੀ_____

ਵਾਸੀ _____

"EVALUATION OF VOIDING DYSFUNCTION IN WOMEN: A PROSPECTIVE STUDY" ਤੇ ਚਲ ਰਹੀ ਖੋਜ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਰਜ਼ਾਮੰਦ ਹਾਂ। ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਲਈ ਮੈ ਆਪਣੀ ਮਰਜ਼ੀ ਨਾਲ ਤਿਆਰ ਹਾਂ। ਮੈ ਇਹ ਦਸਣਾ ਚਾਹੁੰਦਾ ਹਾਂ/ ਚਾਹੁੰਦੀ ਹਾਂ ਕੇ ਇਹ ਰਜ਼ਾਮੰਦੀ ਦੇਣ ਵਾਸਤੇ ਮੈਨੂ ਕਿਸੇ ਵੀ ਤਰਾਂ ਦਾ ਲੋਭ-ਲਾਲਚ ਨਹੀ ਦਿੱਤਾ ਗਿਆ ਅਤੇ ਨਾ ਹੀ ਕੋਈ ਦਬਾ ਪਾਇਆ ਗਿਆ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਦਾ ਮਨੋਰਥ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਭਰੋਸਾ ਦਵਾਇਆ ਗਿਆ ਹੈ ਕੇ ਇਹ ਖੋਜ ਵਿਗਿਆਨ ਅਤੇ ਮਾਨਵਤਾ ਦੀ ਭਲਾਈ ਲਈ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਵਿਚ ਹੋਣ ਵਾਲੇ ਖਤਰੇ ਬਾਰੇ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ ਅਤੇ ਮੈਨੂ ਇਹ ਯਕੀਨ ਹੈ ਕੇ ਇਹ ਖਤਰਾ ਬਹੁਤ ਮਾਮੂਲੀ ਹੈ। ਮੈਨੂ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਦਾ ਢੰਗ – ਤਰੀਕਾ ਸਮਝਾ ਦਿੱਤਾ ਗਿਆ ਹੈ।

ਮੈ ਇਸ ਖੋਜ ਕੰਮ ਵਿਚ ਹਿੱਸਾ ਲੈਣ ਬਾਰੇ ਆਪਣੀ ਰਜ਼ਾਮੰਦੀ ਕਿਸੇ ਵੀ ਸਮੇ ਵਾਪਸ ਲੈ ਸਕਦਾ ਹਾਂ/ ਸਕਦੀ ਹਾਂ ਅਤੇ ਮੇਰੀ ਰਜ਼ਾਮੰਦੀ ਵਾਪਸ ਲੈਣ ਦਾ ਮੇਰੇ ਇਲਾਜ ਤੇ ਕੋਈ ਅਸਰ ਨਹੀ ਹੋਵੇਗਾ।

_____
ਗਵਾਹ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____

ਪਤਾ _____

_____
ਮਰੀਜ਼ ਦੇ ਹਸਤਾਖਰ

ਮਿਤੀ_____

ਪਤਾ _____

_____
ਨਿਰੀਖਕ ਦੇ ਹਸਤਾਖਰ

_____
ਸਿਖਿਆਰਥੀ ਦੇ ਹਸਤਾਖਰ